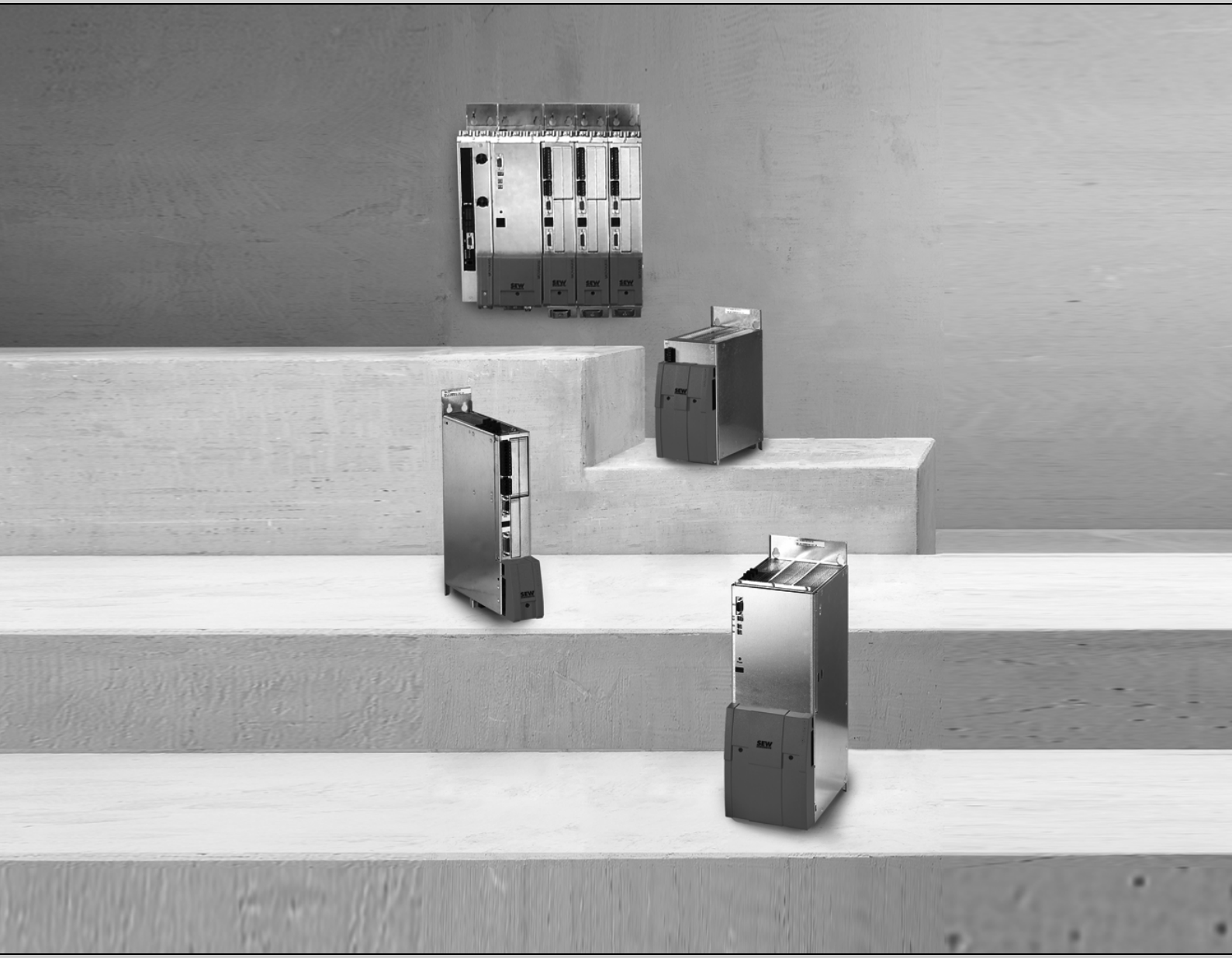
SEW EURODRIVE

Operating Instructions



MOVIAXIS® Multi-Axis Servo Inverter

Edition 08/2011

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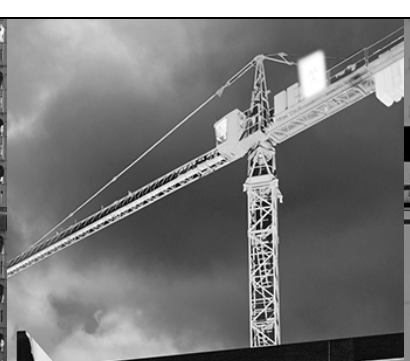

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1 General information

1.1 Structure of the safety notes

The safety notes in these operating instructions are designed as follows:

Pictogram	SIGNAL WORD
	Type and source of danger. Possible consequence(s) if disregarded. • Measure(s) to prevent the danger.

Pictogram	Signal word	Meaning	Consequences if disregarded
Example: General danger Specific danger, e.g. electric shock	**DANGER**	Imminent danger	Severe or fatal injuries
	WARNING	Possible dangerous situation	Severe or fatal injuries
	CAUTION	Possible dangerous situation	Minor injuries
	NOTICE	Possible damage to property	Damage to the drive system or its environment
	INFORMATION	Useful information or tip. Simplifies the handling of the drive system.	

1.2 Rights to claim under warranty

A requirement of fault-free operation and fulfillment of any rights to claim under limited warranty is that you adhere to the information in the operating instructions. Therefore, read the operating instructions before you start working with the unit.

Make sure that the operating instructions are available to persons responsible for the plant and its operation, as well as to person who work independently on the unit. You must also ensure that the documentation is legible.

1.3 Exclusion of liability

You must comply with the information contained in these operating instructions to ensure safe operation of the MOVIAXIS® multi-axis servo inverter and to achieve the specified product characteristics and performance requirements. SEW-EURODRIVE assumes no liability for injury to persons or damage to equipment or property resulting from non-observance of these operating instructions. In such cases, any liability for defects is excluded.

1.4 MXR supply and regenerative module

In these operating instructions, the MXR supply and regenerative module is mentioned as an optional component of a MOVIAXIS® axis system.

For detailed information about this module, refer to the "MXR Supply and Regenerative Module" manual.

1.5 Copyright

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2 Safety Notes

The following basic safety notes must be read carefully to prevent injury to persons and damage to property. The operator must ensure that the basic safety notes are read and adhered to. Make sure that persons responsible for the plant and its operation, as well as persons who work independently on the unit, have read through the operating instructions carefully and understood them. If you are unclear about any of the information in this documentation or if you require further information, please contact SEW-EURODRIVE.

2.1 General information

Never install damaged products or put them into operation. Submit a complaint to the shipping company immediately in the event of damage.

During operation, multi-axis servo inverters can have live, bare and movable or rotating parts as well as hot surfaces, depending on their enclosure.

Removing covers without authorization, improper use as well as incorrect installation or operation may result in severe injuries to persons or damage to property.

Refer to this documentation for more information.

2.2 Target group

Only qualified electricians are authorized to install, startup or service the units or correct unit faults (observing IEC 60364 or CENELEC HD 384 or DIN VDE 0100 and IEC 60664 or DIN VDE 0110 as well as national accident prevention guidelines).

Qualified personnel in the context of these basic safety notes are: All persons familiar with installation, assembly, startup and operation of the product who possess the necessary qualifications.

Any activities regarding transportation, storage, operation, and disposal must be carried out by persons who have been instructed appropriately.

2.3 Designated use

MOVIAXIS® MX multi-axis servo inverters are units for use in industrial and commercial systems to operate permanent-field synchronous AC motors and asynchronous AC motors with encoder feedback. These motors must be suitable for operation with servo inverters. Connect other loads to the units only after you have consulted the manufacturer.

MOVIAXIS® MX multi-axis servo inverters are intended for use in metal control cabinets. These metal control cabinets represent the necessary enclosure for the application as well as the grounding over a large area required for EMC purposes.

When installed in machines, startup of the multi-axis servo inverters (i.e. start of designated operation) is prohibited until it is determined that the machine meets the requirements stipulated in EC directive 2006/42/EC (Machine Directive). You must also observe EN 60204.

Startup (i.e. the start of designated use) is only permitted under observance of the EMC directive (2004/108/EC).

The multi-axis servo inverters meet the requirements stipulated in the low voltage guideline 2006/95/EC. The harmonized standards of the EN 61800-5-1/DIN VDE T105 series in connection with EN 60439-1/VDE 0660 part 500 and EN 60146/VDE 0558 are applied to these multi-axis servo inverters.

You must observe the technical data and information on the connection requirements as provided on the nameplate and in the documentation.

2.3.1 Safety functions

MOVIAXIS® multi-axis servo inverters may not take on safety functions without a higher-level safety system. Use higher-level safety systems to ensure protection of equipment and personnel.

For safety applications, refer to the information in the following publication:

- Functional Safety.

2.4 Transportation and storage

You must observe the notes on transportation, storage and proper handling. Observe the climatic conditions as stated in the chapter "General technical data".

2.5 Installation

The units must be installed and cooled according to the regulations and specifications in the corresponding documentation.

Protect multi-axis servo inverters from excessive strain. Ensure that components are not deformed and/or insulation spaces are maintained, particularly during transportation. Avoid contact with electronic components and contacts.

Multi-axis servo inverters contain components that can be damaged by electrostatic energy and could be destroyed in case of improper handling. Prevent mechanical damage or destruction of electric components. This may pose health risks under certain circumstances.

The following applications are prohibited unless the unit is explicitly designed for such use:

- Use in potentially explosive areas.
- Use in areas exposed to harmful oils, acids, gases, vapors, dust, radiation, etc.
- Use in non-stationary applications which are subject to mechanical vibration and impact loads in excess of the requirements in EN 61800-5-1.

2.6 Electrical connection

Observe the applicable national accident prevention guidelines when working on live multi-axis servo inverters (for example, BGV A3).

Perform electrical installation according to the pertinent regulations, e.g. cable cross sections, fusing, protective conductor connection. For any additional information, refer to the applicable documentation.

You will find notes on EMC-compliant installation, such as shielding, grounding, arrangement of filters and routing of lines, in the documentation of the multi-axis servo inverter. Always observe these notes even with multi-axis servo inverters bearing the CE marking. The manufacturer of the system or machine is responsible for maintaining the limits established by EMC legislation.

Protective measures and protection devices must comply with the regulations in force, e.g. EN 60204 or EN 61800-5-1.

Required preventive measure: Grounding the unit.

Cables may only be connected and switches may only be operated in a de-energized state.

2.7 Safe disconnection

The unit meets all requirements for safe disconnection of power and electronic connections in accordance with EN 61800-5-1. All connected circuits must also satisfy the requirements for safe disconnection.

2.8 Operation

Systems with integrated multi-axis servo inverters must be equipped with additional monitoring and protection devices, if necessary, according to the applicable safety guidelines, such as the law governing technical equipment, accident prevention regulations, etc. Changes to the drive inverter using the software are permitted.

Do not touch live components or power connections immediately after disconnecting the multi-axis servo inverters from the supply voltage because there may still be some charged capacitors. Note the respective labels on the multi-axis servo inverter.

Cables may only be connected and switches may only be operated in a de-energized state.

Keep all covers and doors closed during operation.

The unit may still be live and connected to the supply system, even if the operation LEDs and other display elements are no longer illuminated.

Mechanical blocking or internal safety functions of the unit can cause a motor standstill. Eliminating the cause of the problem or performing a reset may result in the drive restarting automatically. If, for safety reasons, this is not permitted for the driven machine, disconnect the unit from the supply system before correcting the error.

Two-row configuration of the axis system:

The two-row MOVIAXIS® axis system without protection caps at the insulators has the degree of protection IP00.

The axis system with two rows may only be operated with installed protection caps at the insulators.

2.9 Unit temperature

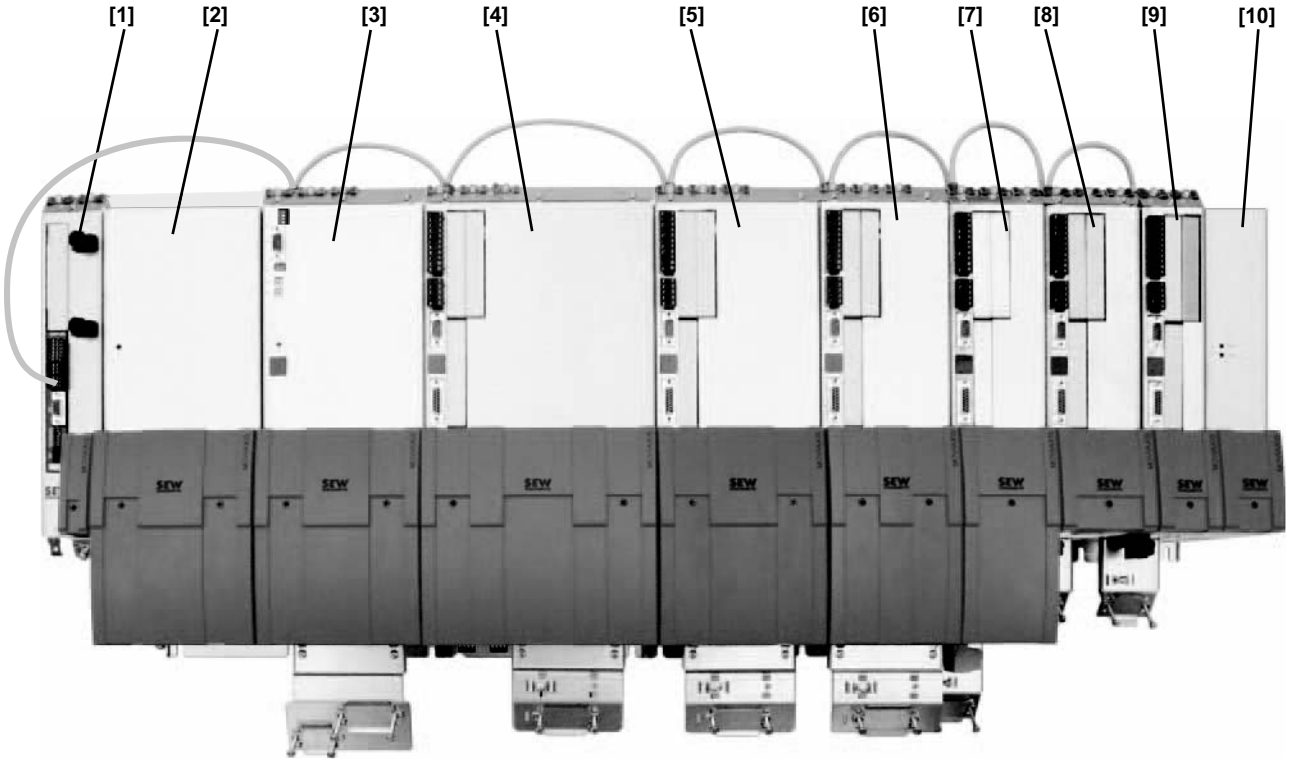
MOVIAXIS® multi-axis servo inverters are usually operated with braking resistors. The braking resistors can also be installed in the housing of the supply modules.

The braking resistors can reach a surface temperature in the range of 70 °C to 250 °C.

Never touch the housings of the MOVIAXIS® modules or the braking resistors during operation or in the cool down phase once the unit has been switched off.

3 Unit Design

3.1 Axis system with CAN-based system bus



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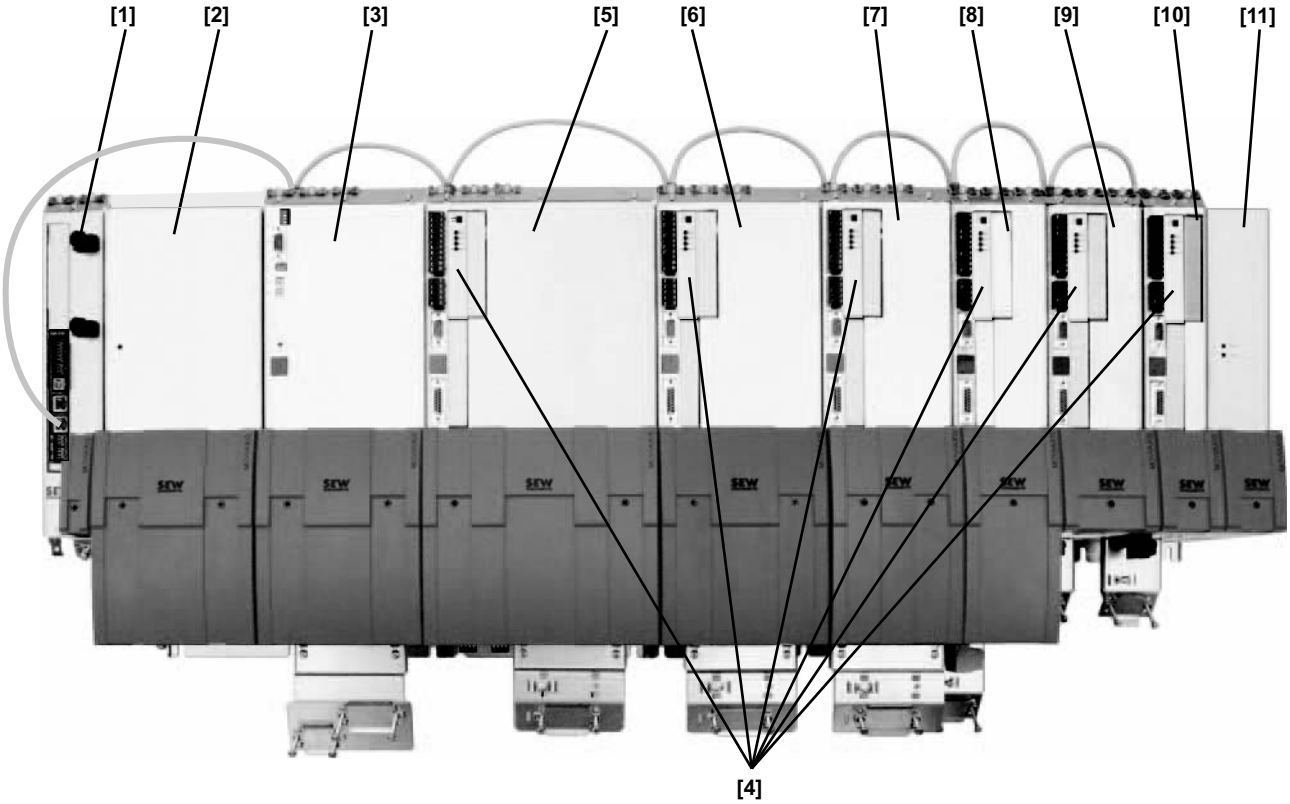
[1] Master module
[2] Capacitor or buffer module
[3] Supply module size 3
[4] Axis module size 6
[5] Axis module size 5
[6] Axis module size 4
[7] Axis module size 3
[8] Axis module size 2
[9] Axis module size 1
[10] 24 V switched-mode power supply module, additional module

3.2 Axis system with EtherCAT®-compatible system bus



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[1] Master module
[2] Capacitor or buffer module
[3] Supply module size 3
[4] Option card for EtherCAT®-based system bus SBUS^{plus} in all axis modules
[5] Axis module size 6
[6] Axis module size 5
[7] Axis module size 4
[8] Axis module size 3
[9] Axis module size 2
[10] Axis module size 1
[11] 24 V switched-mode power supply module, additional module

3.3 Important notes

Protective measures and **protective equipment** must meet the respective national **applicable regulations**.

Required preventive measure:	Protective grounding (protection class I)
Required protection devices:	The overcurrent protection devices have to be designed to protect the lines at the customer's site.

INFORMATION

Follow the specific operating instructions during installation and startup of the motor and the brake!

⚠ WARNING

The "Unit design" illustrations from chapter "Overview of an axis system" (page 24) to chapter "Unit design of DC link discharge module MXZ" (page 42) show the units without the supplied cover (touch guard). The protection cover protects the area of the line and braking resistor connections.

Uncovered power connections.

Severe or fatal injuries from electric shock.

- Never start the unit if the protective covers are not installed.
- Install the protective covers according to the regulations.

3.4 Nameplates and type designations

3.4.1 Structure of the nameplate

The nameplate is divided into up to 3 parts depending on the module.

- Part "I" of the nameplate indicates the type designation, production number and status.
- Part "II" of the nameplate indicates the factory-installed options and the version status.
- Part "III" of the nameplate (system nameplate) contains the technical data of the module.

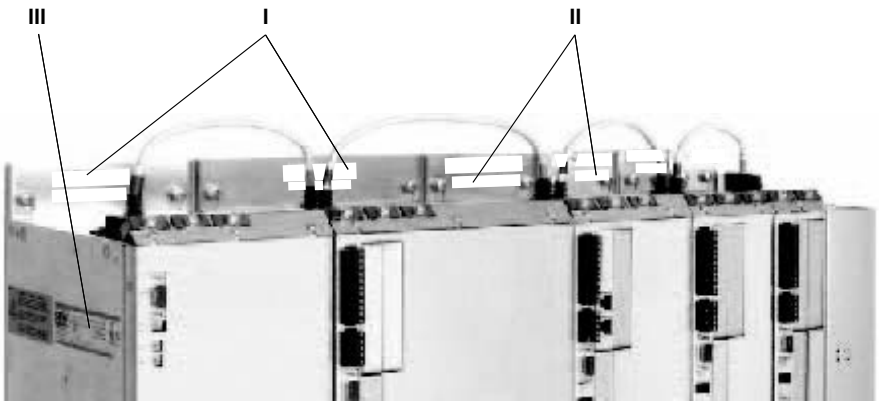
The **system nameplate** is located on the side of the unit for the supply module and axis module.

The nameplate contains a description of the version and the scope of supply of the multi-axis servo inverter at the time of delivery.

There may be deviations if

- E.g. option cards are installed or removed at a later time
- or if the unit firmware is updated.

Location of the nameplate

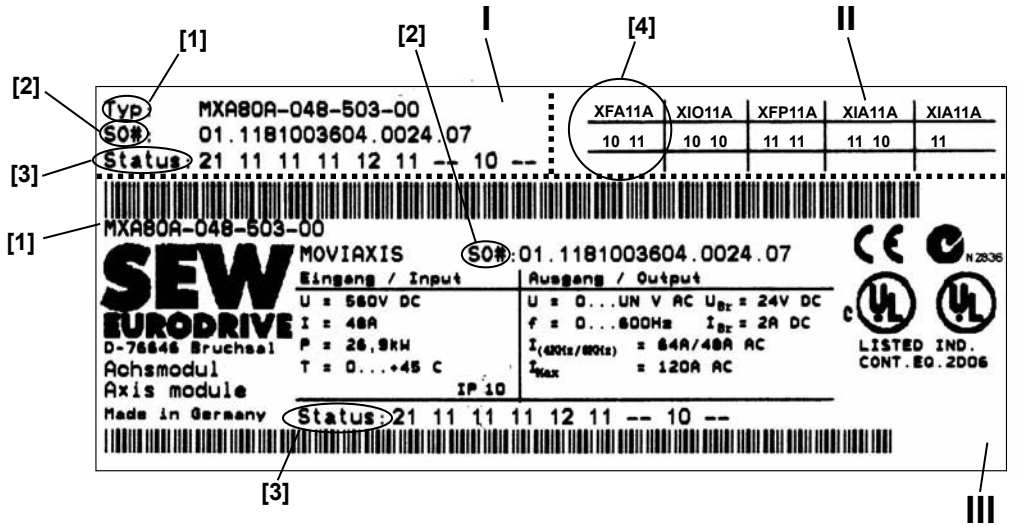


1402316683

I Part "I" of the nameplate
II Part "II" of the nameplate
III Part "III" of the nameplate (system nameplate)

3.4.2 Nameplate of the axis module

The following figure shows the nameplate of the axis module:



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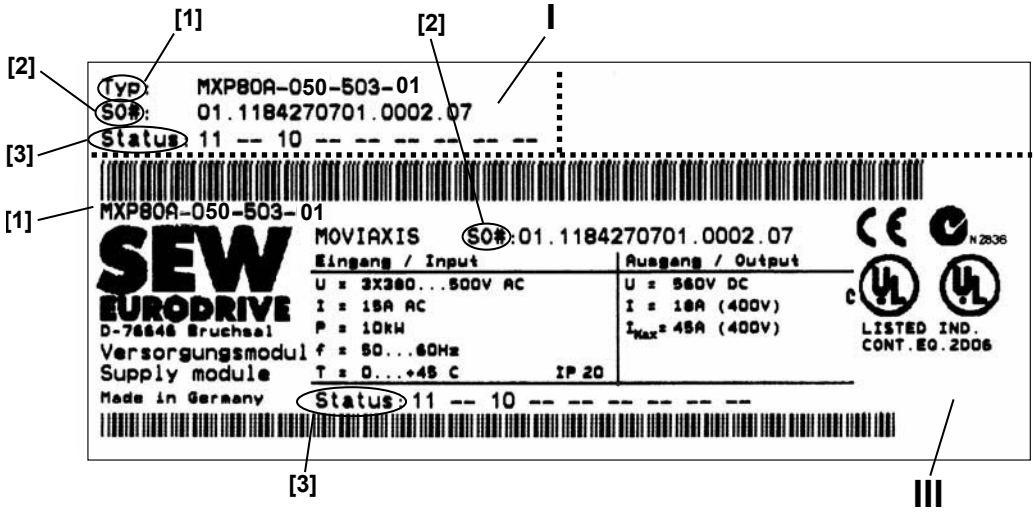
I	Part "I" of the nameplate: Located on the upper fastening plate of the module	[1]	Type designation
II	Part "II" of the nameplate: Located on the upper fastening plate of the module	[2]	Production number
III	Part "III" of the nameplate: Located at the side of the module housing	[3]	Status
		[4]	Communication slots, firmware status

3.4.3 Nameplate of the supply module

The following figure shows the nameplate of the supply module:

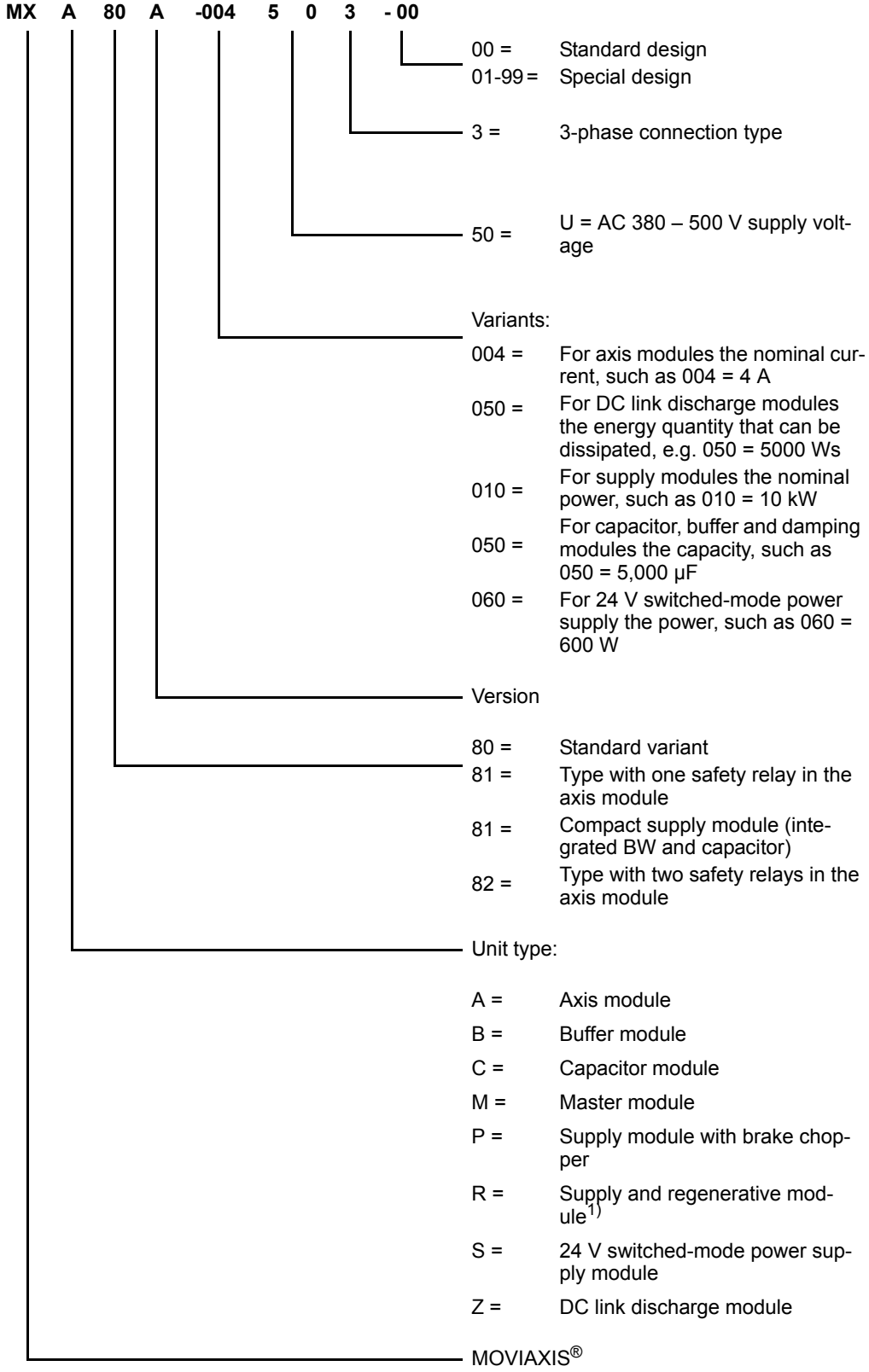


1402450571

I	Part "I" of the nameplate: Located on the upper fastening plate of the module	[1]	Type designation
III	Part "III" of the nameplate: Located at the side of the module housing	[2]	Production number
		[3]	Status

3.4.4 Type designation of MOVIAXIS® basic units

The following diagram shows the type designation:


MX A 80 A -004 5 0 3 - 00
00 = Standard design
01-99 = Special design
3 = 3-phase connection type
50 = U = AC 380 – 500 V supply voltage
Variants:
004 = For axis modules the nominal current, such as 004 = 4 A
050 = For DC link discharge modules the energy quantity that can be dissipated, e.g. 050 = 5000 Ws
010 = For supply modules the nominal power, such as 010 = 10 kW
050 = For capacitor, buffer and damping modules the capacity, such as 050 = 5,000 µF
060 = For 24 V switched-mode power supply the power, such as 060 = 600 W
Version
80 = Standard variant
81 = Type with one safety relay in the axis module
81 = Compact supply module (integrated BW and capacitor)
82 = Type with two safety relays in the axis module
Unit type:
A = Axis module
B = Buffer module
C = Capacitor module
M = Master module
P = Supply module with brake chopper
R = Supply and regenerative module 1)
S = 24 V switched-mode power supply module
Z = DC link discharge module
MOVIAXIS®

1) For information on MXR, refer to the "Supply and Regenerative Module" manual

Unit designation for the axis module:

MXA80A-004-503-00	=	Axis module with 4 A nominal current

Unit designation for the buffer module component

MXB80A-050-503-00	=	Buffer module with a capacity of 5000 µF

Unit designation for the capacitor module component

MXC80A-050-503-00	=	Capacitor module with a capacity of 5000 µF

Type designation for master module with fieldbus gateway component:

MXM80A-000-000-00/UFF41B	=	Master module with PROFIBUS/DeviceNet
MXM80A-000-000-00/UFR41B	=	Master module with EtherNet/IP / PROFINET Modbus/ TCP

Type designation for master module with controller component:

MXM80A-000-000-00/DHF41B/ OMH41B	=	Master module with PROFIBUS/DeviceNet
MXM80A-000-000-00/DHR41B/ OMH41B	=	Master module with EtherNet/IP / PROFINET Modbus/ TCP
		Variants: T0 – T25

Unit designation for the supply module:

MXP81A-010-503-00	=	10 kW compact supply module with integrated C and BW
MXP80A-010-503-00	=	10 kW supply module
MXR80A-075-503-00[1)]	=	50/75 kW supply and regenerative module

1) For detailed information on MXR, refer to the "Supply and Regenerative Module" manual"

Type designation for the 24 V switched-mode power supply module component

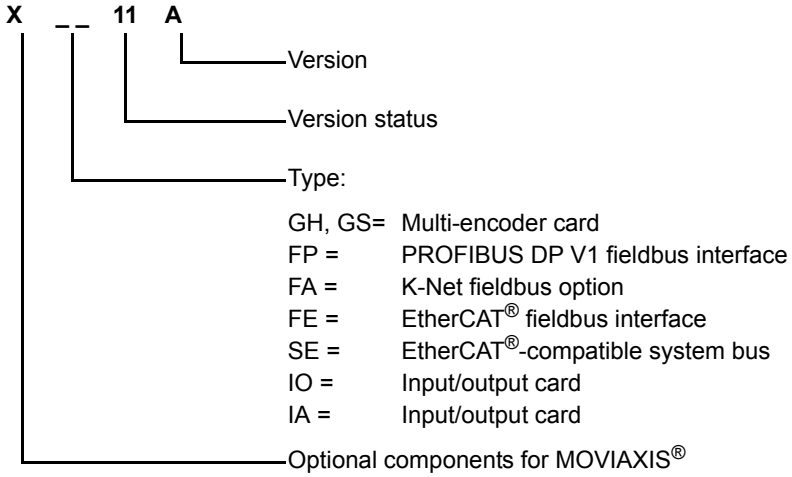
MXS80A-060-503-00	=	24 V switched-mode power supply module

Type designation for the DC link discharge module component:

MXZ80A-050-503-00	=	DC link discharge module with an energy quantity of 5000 Ws that can be dissipated

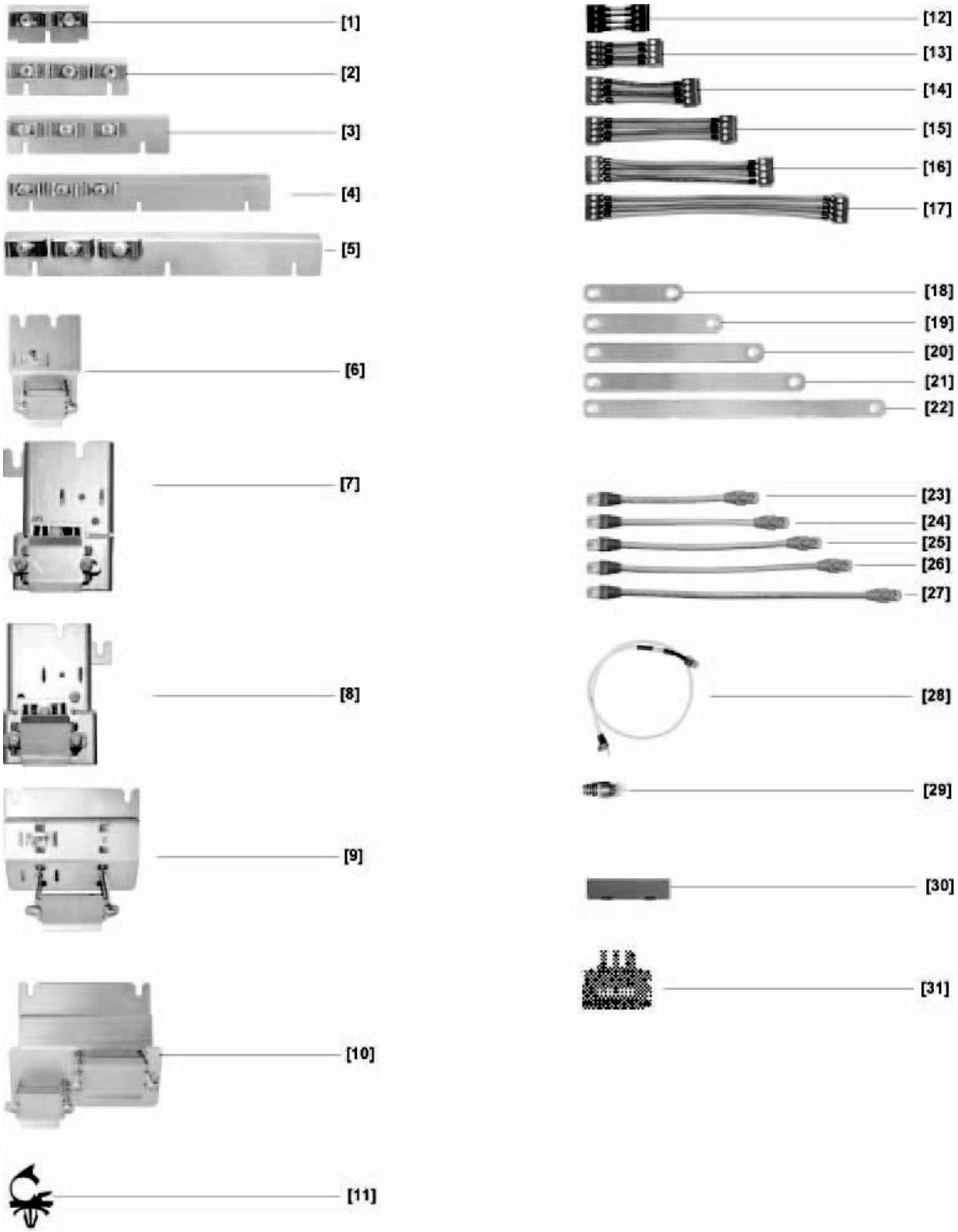
3.4.5 Type designation for MOVIAXIS® optional components

The following diagram shows the type designation:



3.5 Standard accessories

Standard accessories are included with the basic unit at delivery.



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The corresponding mating connectors for all connectors are installed at the factory. An **exception** are the D-sub connectors; they are supplied without mating connector.

3.5.1 Assignment table for standard accessories

Assignment table for standard accessories – Mechanical accessories

No.	Dimension[1)]	MXM	MXZ	MXS	MXP in kW					MXR	MXA in A										MXC	MXB
					10	10E[2)]	25	50	75		2	4	8	12	16	24	32	48	64	100		
Electronics shield clamp																						
[1]	60 mm	**1x**								**1x**	**1x**	**1x**	**1x**									
[2]	90 mm				**1x**		**1x**							**1x**	**1x**	**1x**	**1x**					
[3]	120 mm					**1x**												**1x**				
[4]	150 mm						**1x**	**1x**	**1x**	**1x**									**1x**			
[5]	210 mm																			**1x**		
Power shield clamp																						
[6]	60 mm				**1x**	**1x**					**1x**	**1x**	**1x**	**1x**	**1x**	**1x**						
[7]	60 mm[3)]						**1x**															
[8]	60 mm[4)]																**1x**					
[9]	105 mm		**1x**															**1x**	**1x**	**1x**		
[10]	105 mm							**1x**	**1x**	**1x**												
Cable lugs																						
[11]		**3x**																				

1) Length of the cables: Length of the bulk cable without connector
2) MXP81A supply module with integrated braking resistor
3) Clamp with short support, 60 mm wide
4) Clamp with long support, 60 mm wide

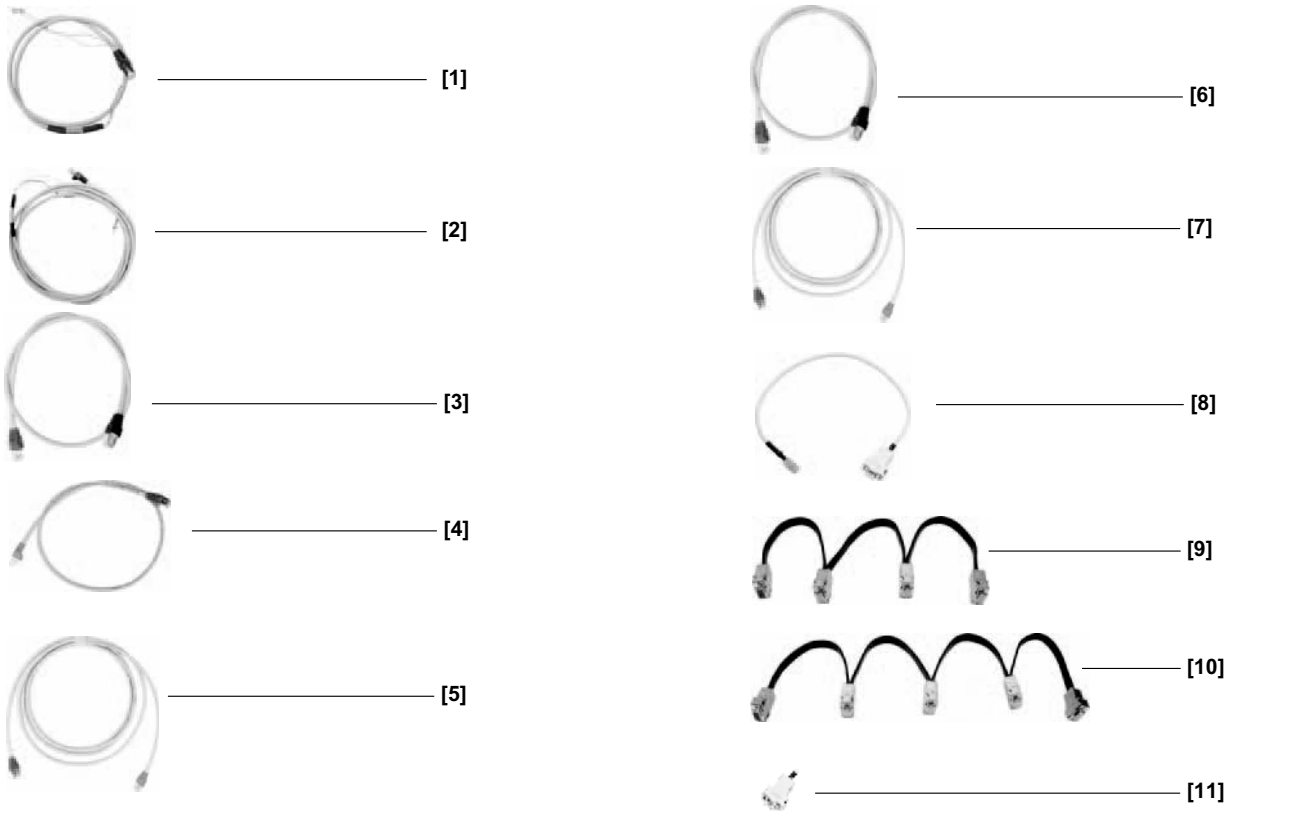
Assignment table for standard accessories – Electric accessories

No.	Dimension[1)]	MXM	MXZ	MXS	MXP in kW					MXR	MXA in A										MXC	MXB
					10	10E[2)]	25	50	75		2	4	8	12	16	24	32	48	64	100		
24 V supply cable																						
[12]	40 mm	**1x**																				
[13]	50 mm			**1x**							**1x**	**1x**	**1x**									
[14]	80 mm				**1x**		**1x**							**1x**	**1x**	**1x**	**1x**					
[15]	110 mm		**1x**			**1x**												**1x**				
[16]	140 mm							**1x**	**1x**										**1x**		**1x**	**1x**
[17]	200 mm									**1x**										**1x**		
DC link connection																						
[18]	76 mm			**3x**							**3x**	**3x**	**3x**									
[19]	106 mm				**3x**									**3x**	**3x**	**3x**	**3x**					
[20]	136 mm		**2x**			**3x**												**3x**				
[21]	160 mm						**3x**	**3x**	**3x**										**3x**		**3x**	**3x**
[22]	226 mm									**3x**										**3x**		
Connection cable for CAN-based system bus SBus/EtherCAT®-compatible system bus SBus^{plus}																						
[23]	200 mm										**1x**	**1x**	**1x**									
[24]	230 mm				**1x**		**1x**							**1x**	**1x**	**1x**	**1x**					
[25]	260 mm					**1x**												**1x**				
[26]	290 mm							**1x**	**1x**										**1x**			
[27]	350 mm									**1x**										**1x**		
CAN - master module connection cable																						
[28]	750 mm	**1x**																				
CAN terminating resistor																						
[29]					**1x**	**1x**	**1x**	**1x**	**1x**	**1x**												
Touch guard																						
[30]					**2x**	**2x**	**2x**	**2x**	**2x**													
Measurement cable connector																						
[31]										**1x**												

1) Length of the cables: Length of the bulk cable without connector

2) MXP81A supply module with integrated braking resistor

3.6 Optional accessories



3.6.1 Assignment table for optional accessories

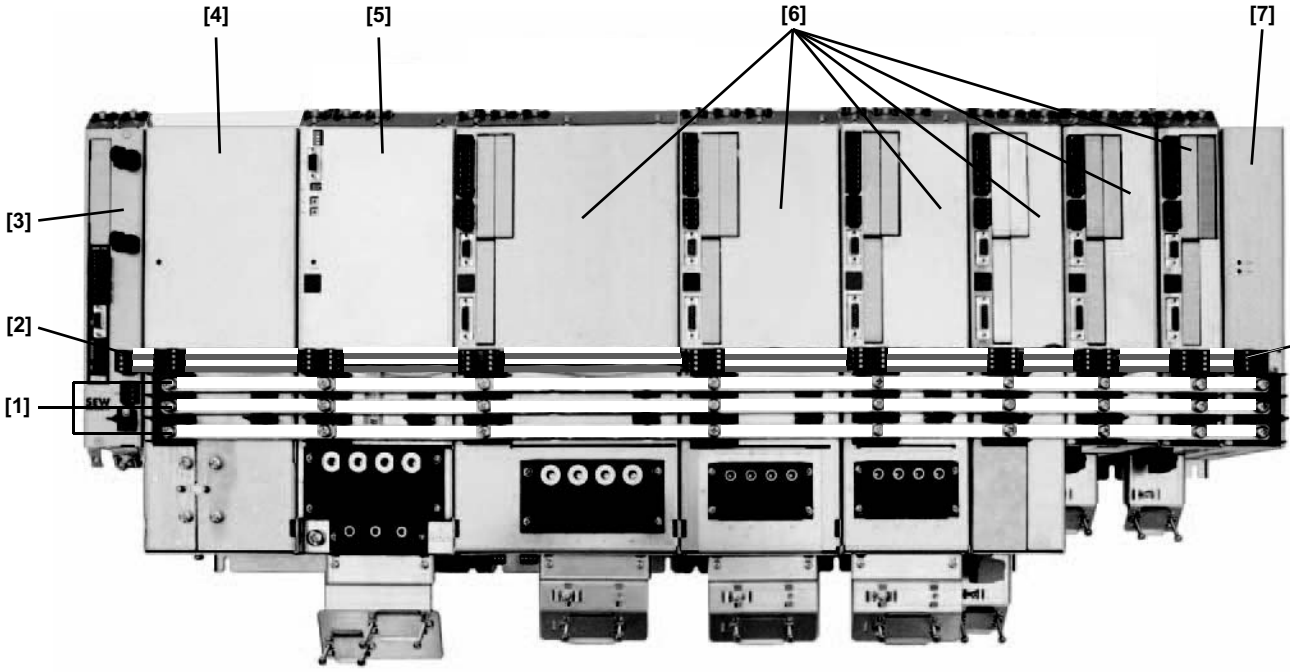
No.	Dimensions / designation / connector type
System bus connection cable for CAN-based system bus SBus (axis system with other SEW units)	
[1]	750 mm RJ45 / open end
[2]	3000 mm RJ45 / open end
CAN - master module connection cable	
[3]	520 mm 2 × RJ45
	3000 mm 2 × RJ45
EtherCAT® - master module connection cable	
[3]	750 mm 2 × RJ45
System bus connection cable for EtherCAT®-based system bus SBus^{plus} (axis system to other SEW units)	
[4]	750 mm 2 × RJ45 (special assignment)
[5]	3000 mm 2 × RJ45 (special assignment)
System bus connection cable CAN (axis system to axis system)	
[6]	750 mm 2 × RJ45 (special assignment)
[7]	3000 mm 2 × RJ45 (special assignment)
Adapter cable master module to CAN2	
[8]	500 mm Weidmüller to Sub-D9 w
	3000 mm Weidmüller to Sub-D9 w

Table continued on next page.

No.	Dimensions / designation / connector type
Connection cable for CAN-based application bus CAN2	
[9]	3 modules Sub-D9 m/w
[10]	4 modules Sub-D9 m/w
CAN2 terminating resistor	
[11]	Sub-D9
Other accessories	
	Temperature sensor assembly kit

3.7 Overview of an axis system

The units are displayed without cover in the following figure.



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[1] X4: DC link connection
[2] X5a, X5b: 24 V voltage supply
[3] Master module
[4] Capacitor/buffer module
[5] Supply module BG 3
[6] Axis modules (size 6 - size 1)
[7] 24 V switched-mode power supply module

NOTICE

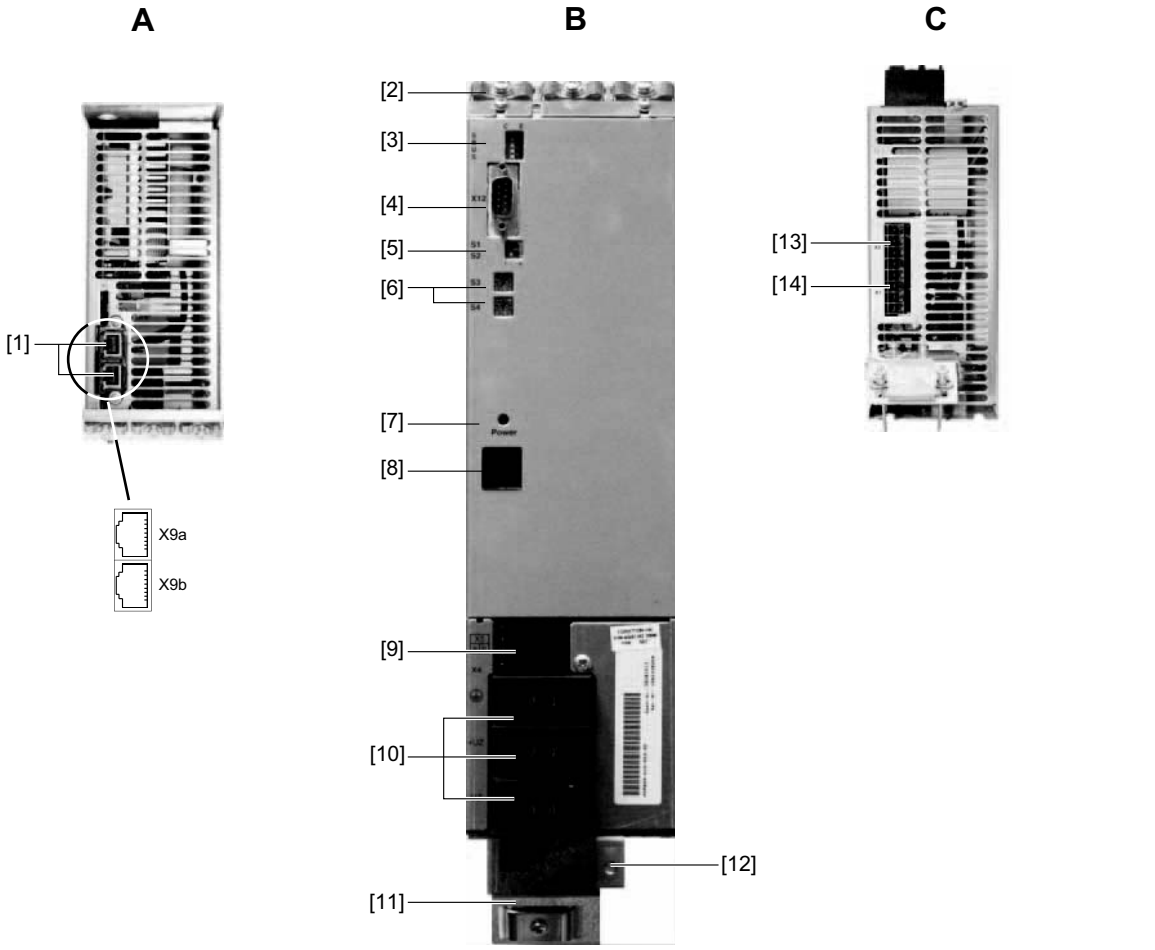
Servo inverter can possibly be damaged!

Only operate the MOVIAXIS® servo inverter when installed in a system as illustrated above. Separate operation of individual modules will damage the servo inverter and is not permitted.

3.8 Unit design of MXP power supply module

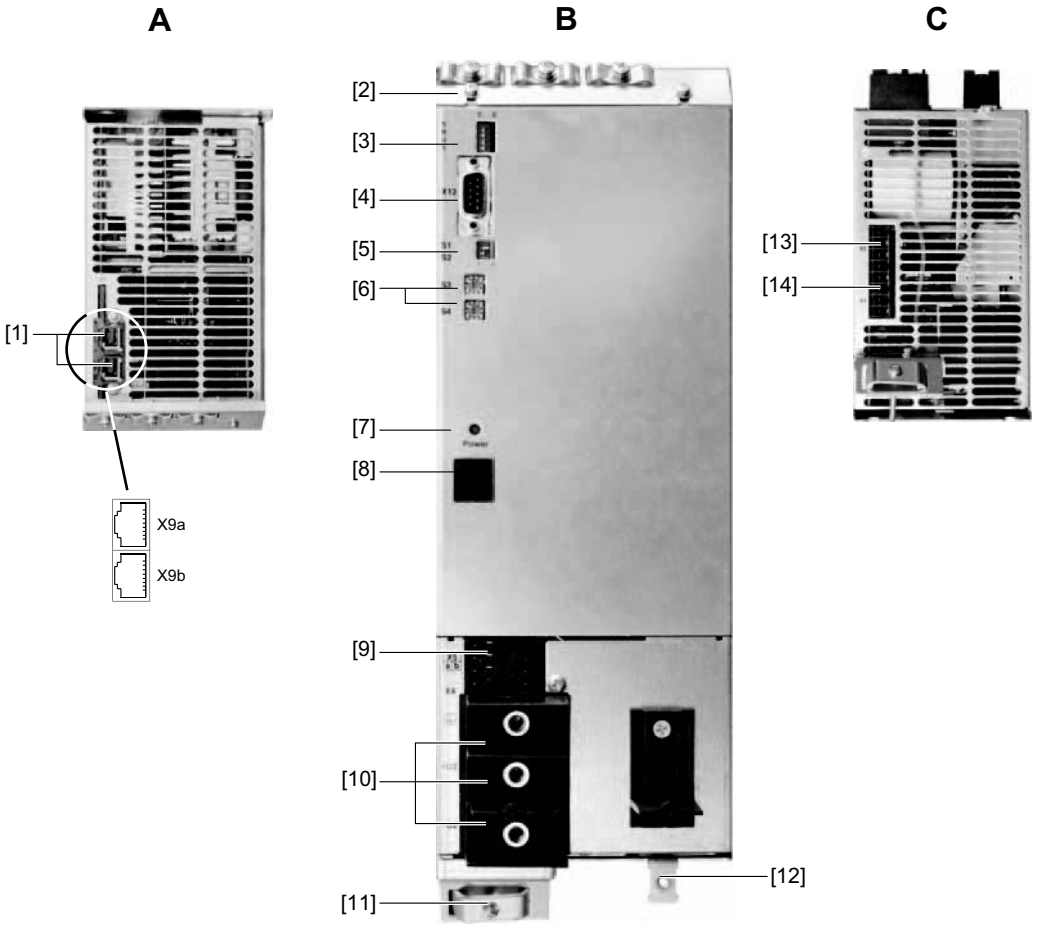
The following illustrations show the units without cover.

3.8.1 MXP supply module, size 1



A	**View from top**	**B**	**View from front**	**C**	**View from bottom**
[1]	System bus X9a: Input, green plug on cable X9b: Output, red plug on cable	[2]	Electronics shield clamps	[13]	X3: Braking resistor resistor
		[3]	C, E: DIP switch - C: CAN-based system bus - E: EtherCAT®-compatible system bus	[14]	X1: Supply system connection
		[4]	X12: CAN system bus		
		[5]	S1, S2: DIP switches for CAN baud rate		
		[6]	S3, S4: Axis address switch		
		[7]	Standby display (Power)		
		[8]	2 x 7-segment display		
		[9]	X5a, X5b: 24 V voltage supply		
		[10]	X4: DC link connection		
		[11]	Power shield clamp		
		[12]	Housing grounding point		

3.8.2 MXP81 supply module with integrated braking resistor, size 1



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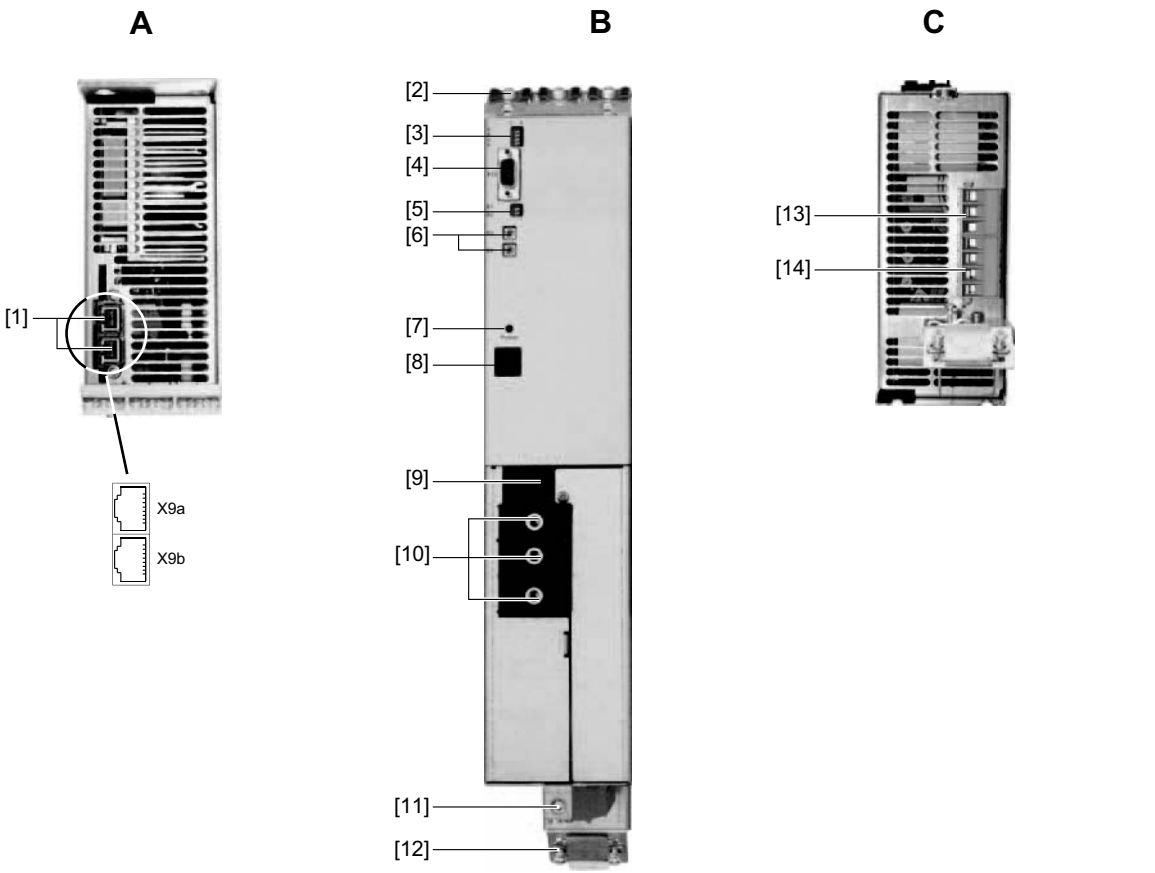
A	**View from top**	**B**	**View from front**	**C**	**View from bottom**
[1]	System bus X9a: Input, green plug on cable X9b: Output, red plug on cable	[2]	Electronics shield clamps	[13]	X3: Connection of emergency braking resistor (optional)
		[3]	C, E: DIP switch - C: CAN-based system bus - E: EtherCAT®-compatible system bus	[14]	X1: Supply system connection
		[4]	X12: CAN system bus		
		[5]	S1, S2: DIP switches for CAN baud rate		
		[6]	S3, S4: Axis address switch		
		[7]	Standby display (Power)		
		[8]	2 x 7-segment display		
		[9]	X5a, X5b: 24 V voltage supply		
		[10]	X4: DC link connection		
		[11]	Power shield clamp		
		[12]	Housing grounding point		

3.8.3 MXP supply module, size 2

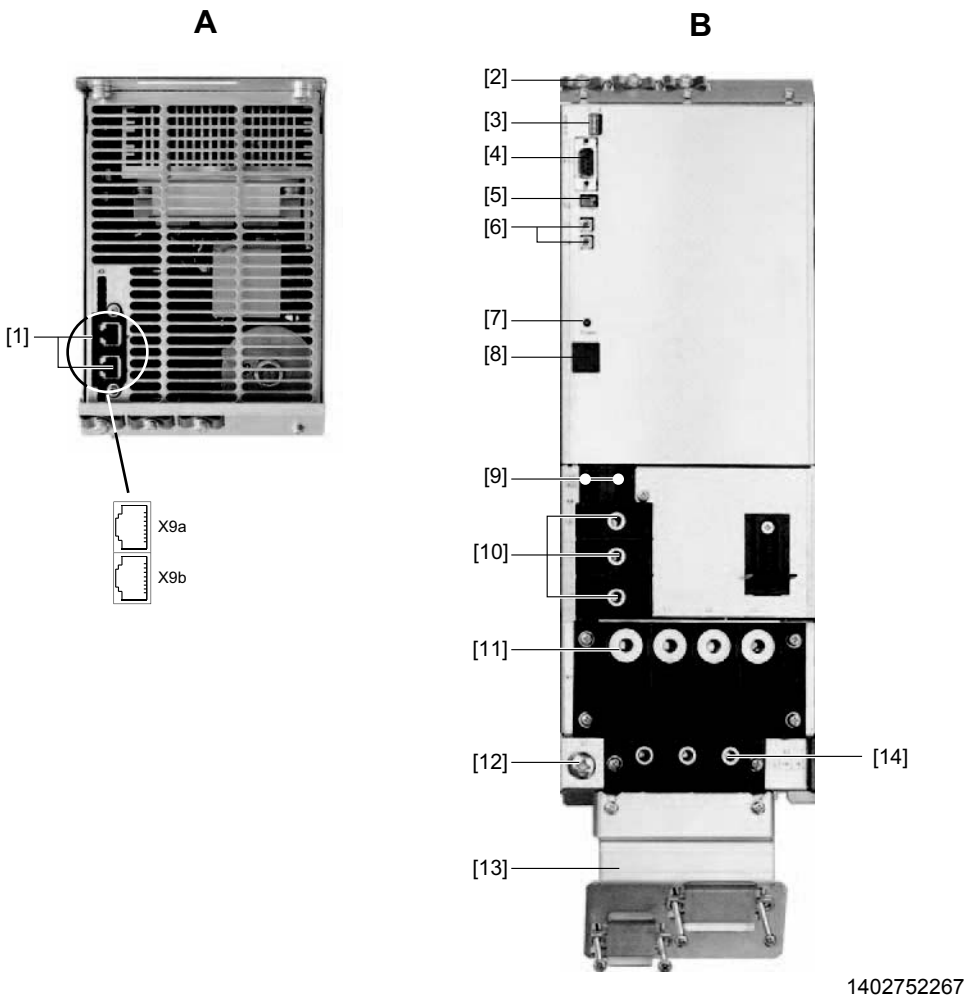


A	**View from top**
[1]	System bus X9a: Input, green plug on cable X9b: Output, red plug on cable

B	**View from front**
[2]	Electronics shield clamps
[3]	C, E: DIP switch - C: CAN-based system bus - E: EtherCAT®-compatible system bus
[4]	X12: CAN system bus
[5]	S1, S2: DIP switches for CAN baud rate
[6]	S3, S4: Axis address switch
[7]	Standby display (Power)
[8]	2 x 7-segment display
[9]	X5a, X5b: 24 V voltage supply
[10]	X4: DC link connection
[11]	Housing grounding point
[12]	Power shield clamp

C	**View from bottom**
[13]	X3: Braking resistor connection
[14]	X1: Supply system connection

3.8.4 MXP supply module, size 3



A	**View from top**
[1]	System bus X9a: Input, green plug on cable X9b: Output, red plug on cable

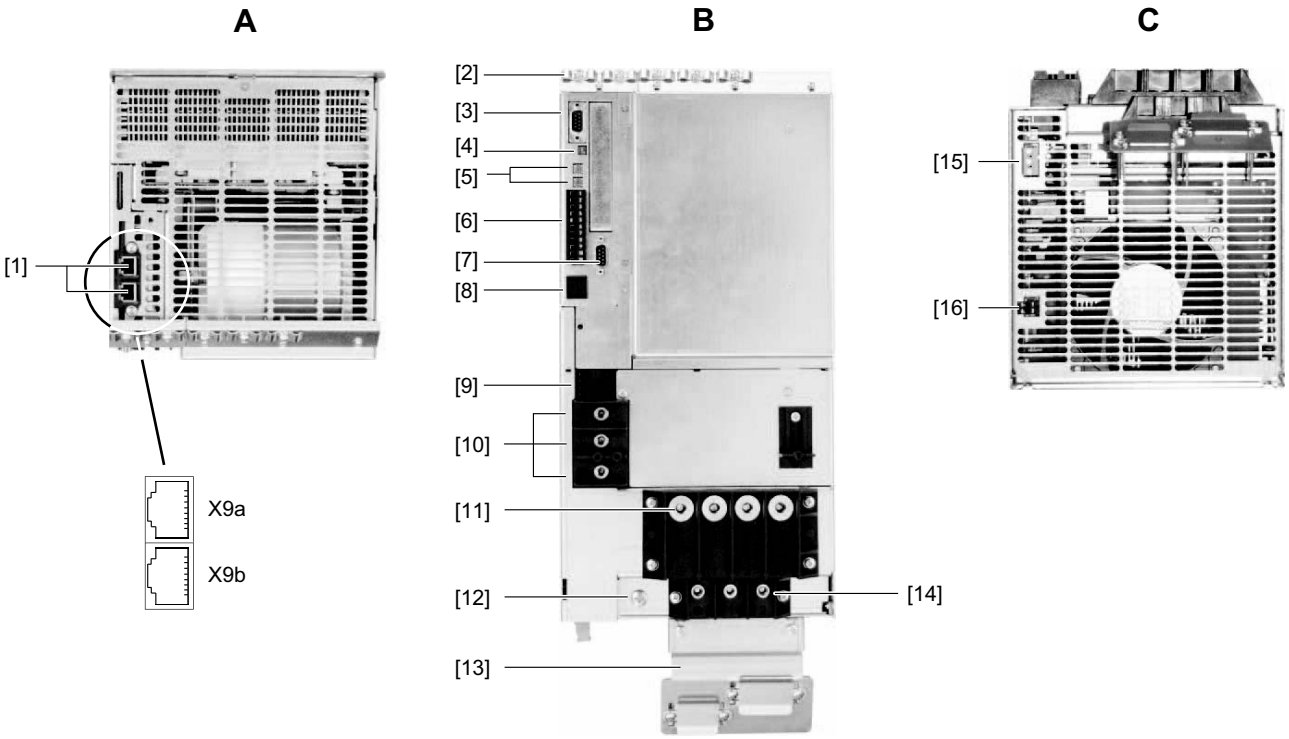
B	**View from front**
[2]	Electronics shield clamps
[3]	C, E: DIP switch - C: CAN-based system bus - E: EtherCAT®-compatible system bus
[4]	X12: CAN system bus
[5]	S1, S2: DIP switch
[6]	S3, S4: Axis address switch
[7]	Standby display (Power)
[8]	2 x 7-segment display
[9]	X5a, X5b: 24 V voltage supply
[10]	X4: DC link connection
[11]	X1: Supply system connection
[12]	Housing grounding point
[13]	Power shield clamp
[14]	X3: Braking resistor connection

3.9 Unit design of the MXR supply and regenerative module

The following illustration shows the unit without protective cover.

For detailed information about MXR, refer to the "MXR Supply and Regenerative Module" manual.

3.9.1 MXR supply and regenerative module



A	**View from top**
[1]	System bus X9a: Input, green plug on cable X9b: Output, red plug on cable

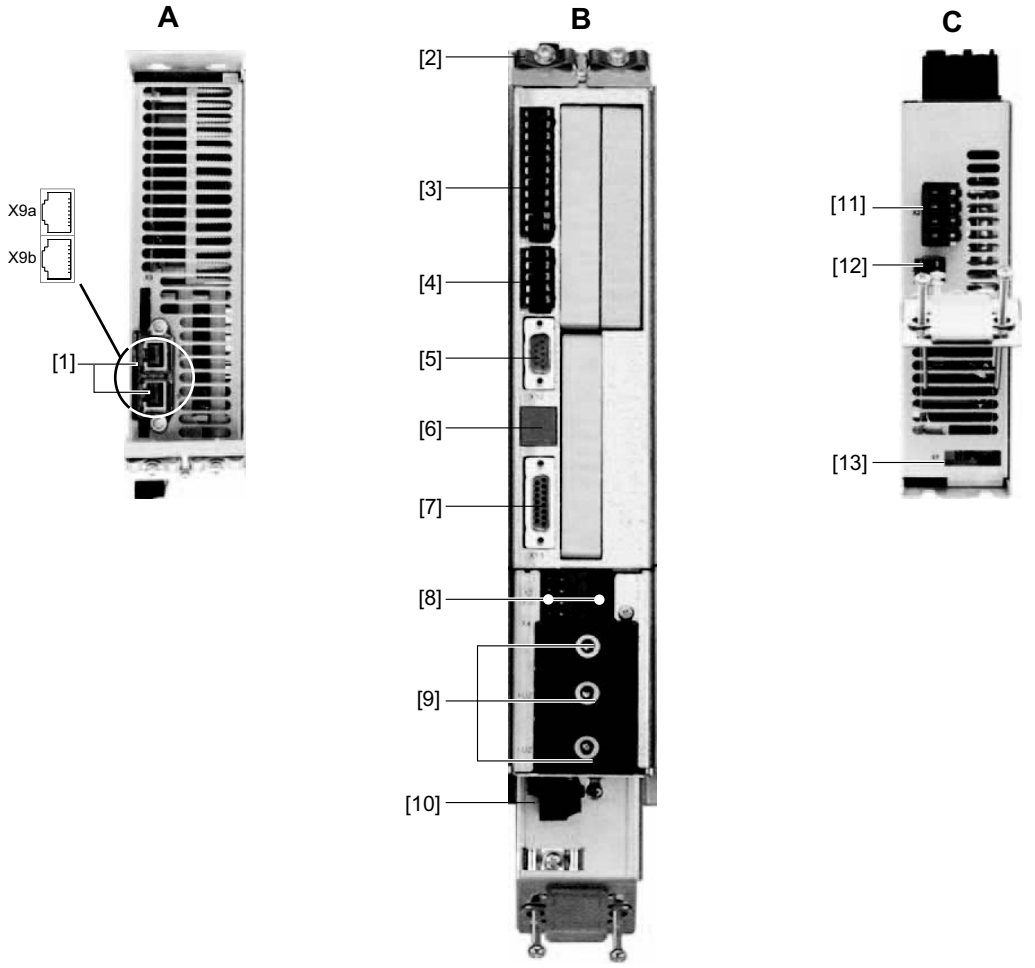
B	**View from front**
[2]	Electronics shield clamps
[3]	X12: CAN system bus
[4]	S1, S2: DIP switch
[5]	S3, S4: Axis address switch
[6]	X10: Binary inputs (pins 1–6) X11: Binary outputs (pins 7–11)
[7]	X17: CAN2 bus
[8]	2 x 7-segment display
[9]	X5a, X5b: 24 V voltage supply
[10]	X4: DC link connection
[11]	X1: Supply system connection
[12]	Housing grounding point
[13]	Power shield clamp
[14]	X3: Braking resistor connection

C	**View from bottom**
[15]	X18: Supply system voltage measurement
[16]	X19: "Power on" switch

3.10 Unit design of MXA axis modules

The following illustrations show the units without cover.

3.10.1 MXA axis module, size 1



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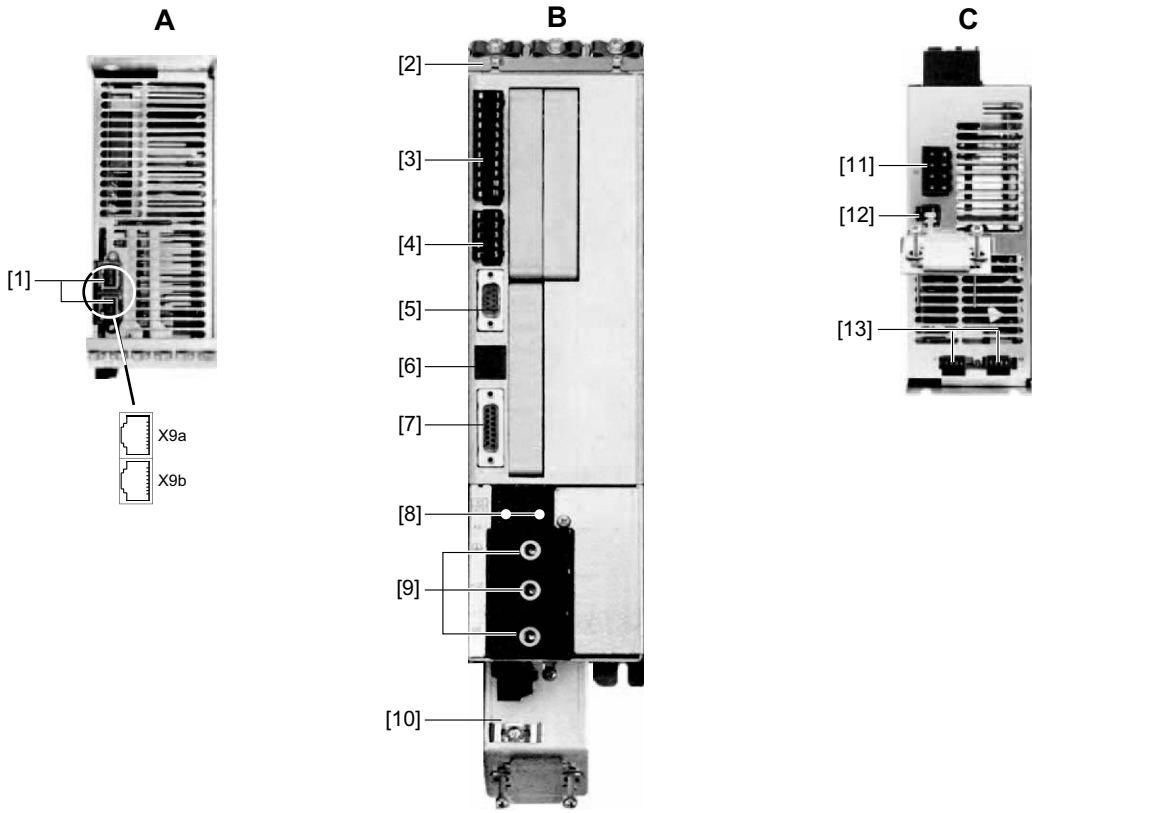
A	**View from top**
[1]	System bus
	X9a: Input, green plug on cable
	X9b: Output, red plug on cable

B	**View from front**
[2]	Electronics shield clamps
[3]	X10: Binary inputs
[4]	X11: Binary outputs
[5]	X12: CAN2 bus
[6]	2 x 7-segment display
[7]	X13 : Motor encoder connection (resolver or Hiperface® + temperature sensor)
[8]	X5a, X5b: 24 V voltage supply
[9]	X4: DC link connection
[10]	Power shield clamp

C	**View from bottom**
[11]	X2: Motor connection
[12]	X6: Brake control
[13]	X7: 1 safety relays (optional variant)

3.10.2 MXA axis module, size 2



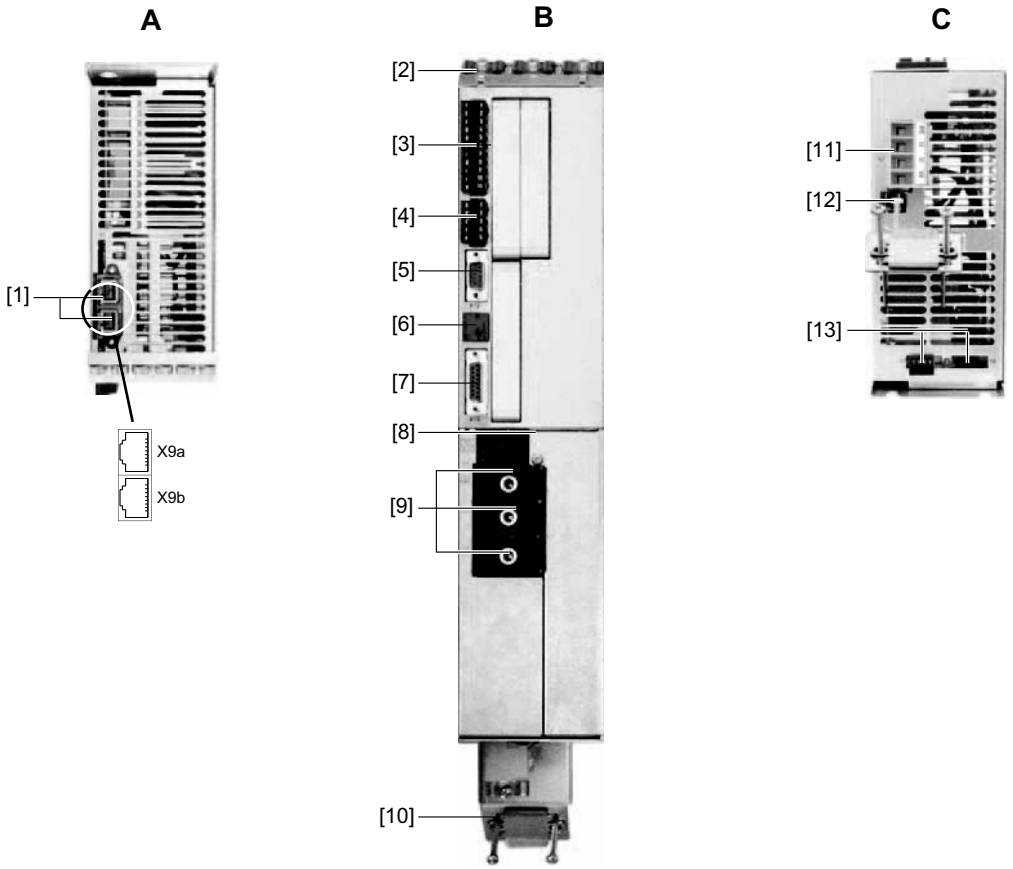
1403023883

A	**View from top**
[1]	System bus X9a: Input, green plug on cable X9b: Output, red plug on cable

B	**View from front**
[2]	Electronics shield clamps
[3]	X10: Binary inputs
[4]	X11: Binary outputs
[5]	X12: CAN2 bus
[6]	2 x 7-segment display
[7]	X13 : Motor encoder connection (resolver or Hiperface® + temperature sensor)
[8]	X5a, X5b: 24 V voltage supply
[9]	X4: DC link connection
[10]	Power shield clamp

C	**View from bottom**
[11]	X2: Motor connection
[12]	X6: Brake control
[13]	X7, X8: 2 safety relays (optional variant)

3.10.3 MXA axis module, size 3



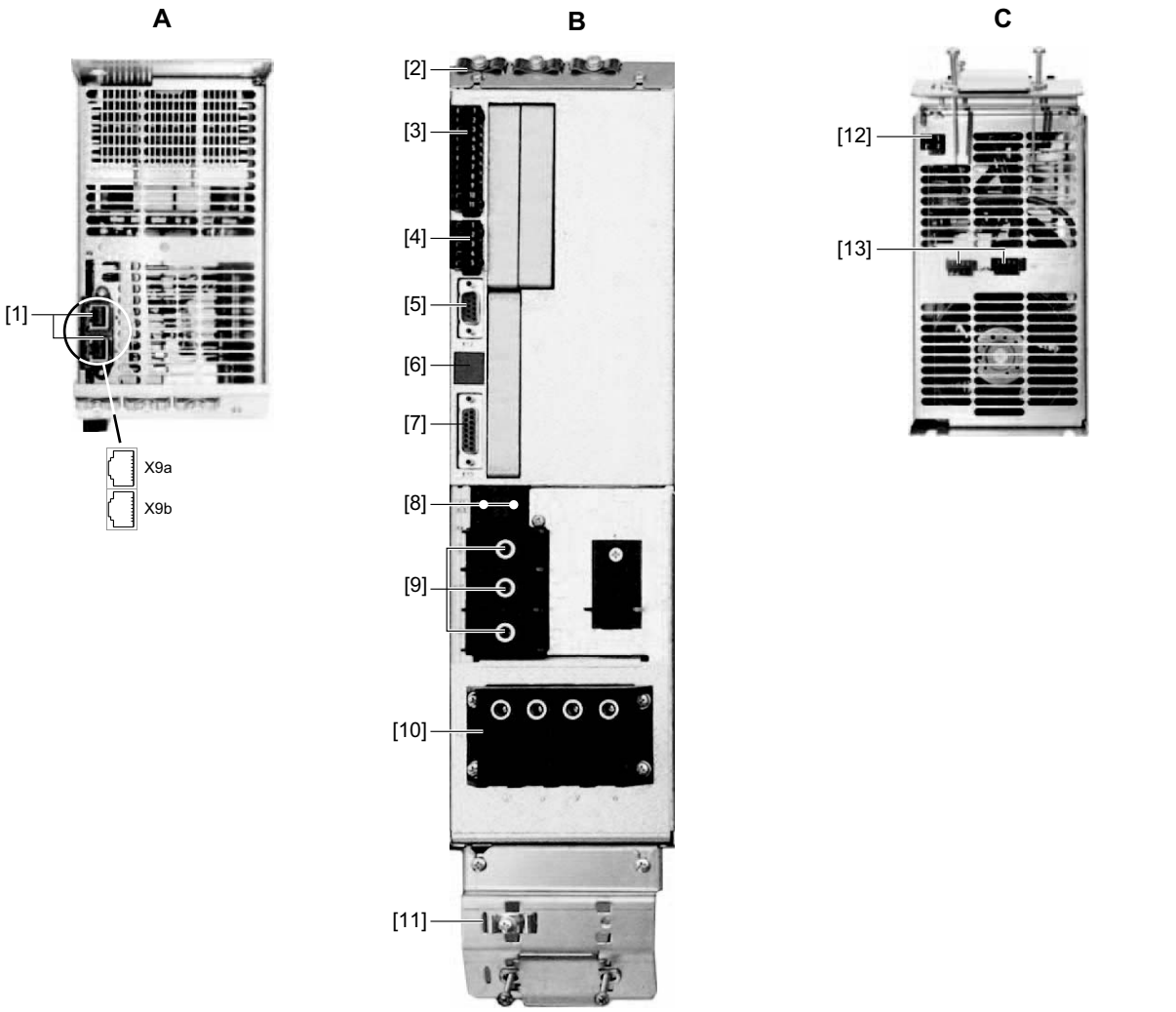
1403027339

A	**View from top**
[1]	System bus X9a: Input, green plug on cable X9b: Output, red plug on cable

B	**View from front**
[2]	Electronics shield clamps
[3]	X10: Binary inputs
[4]	X11: Binary outputs
[5]	X12: CAN2 bus
[6]	2 x 7-segment display
[7]	X13 : Motor encoder connection (resolver or Hiperface® + temperature sensor)
[8]	X5a, X5b: 24 V voltage supply
[9]	X4: DC link connection
[10]	Power shield clamp

C	**View from bottom**
[11]	X2: Motor connection
[12]	X6: Brake control
[13]	X7, X8: 2 safety relays (optional variant)

3.10.4 MXA axis module, size 4



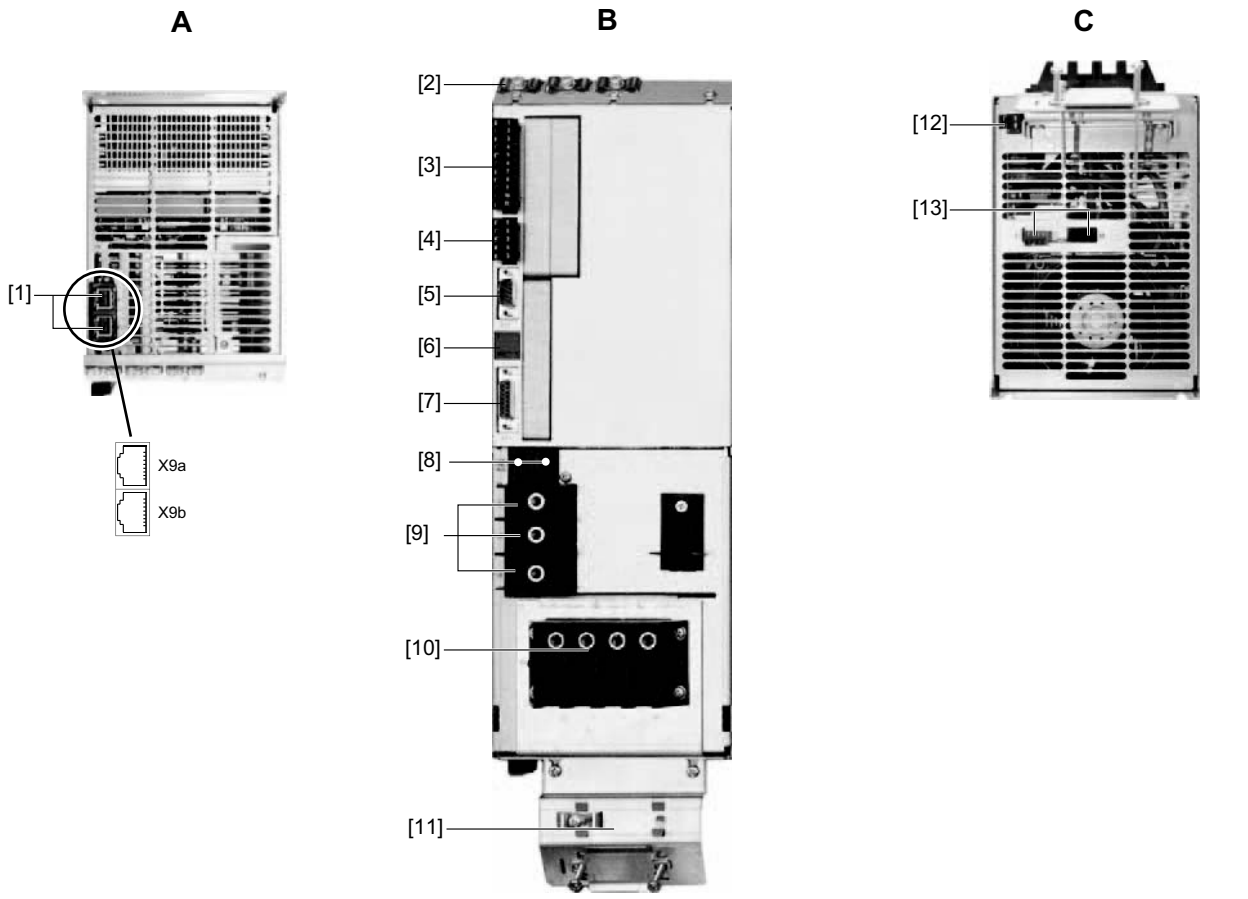
1403029771

A	**View from top**
[1]	System bus X9a: Input, green plug on cable X9b: Output, red plug on cable

B	**View from front**
[2]	Electronics shield clamps
[3]	X10: Binary inputs
[4]	X11: Binary outputs
[5]	X12: CAN2 bus
[6]	2 x 7-segment display
[7]	X13 : Motor encoder connection (resolver or Hiperface® + temperature sensor)
[8]	X5a, X5b: 24 V voltage supply
[9]	X4: DC link connection
[10]	X2: Motor connection
[11]	Power shield clamp

C	**View from bottom**
[12]	X6: Brake control
[13]	X7, X8: 2 safety relays (optional variant)

3.10.5 MXA axis module, size 5



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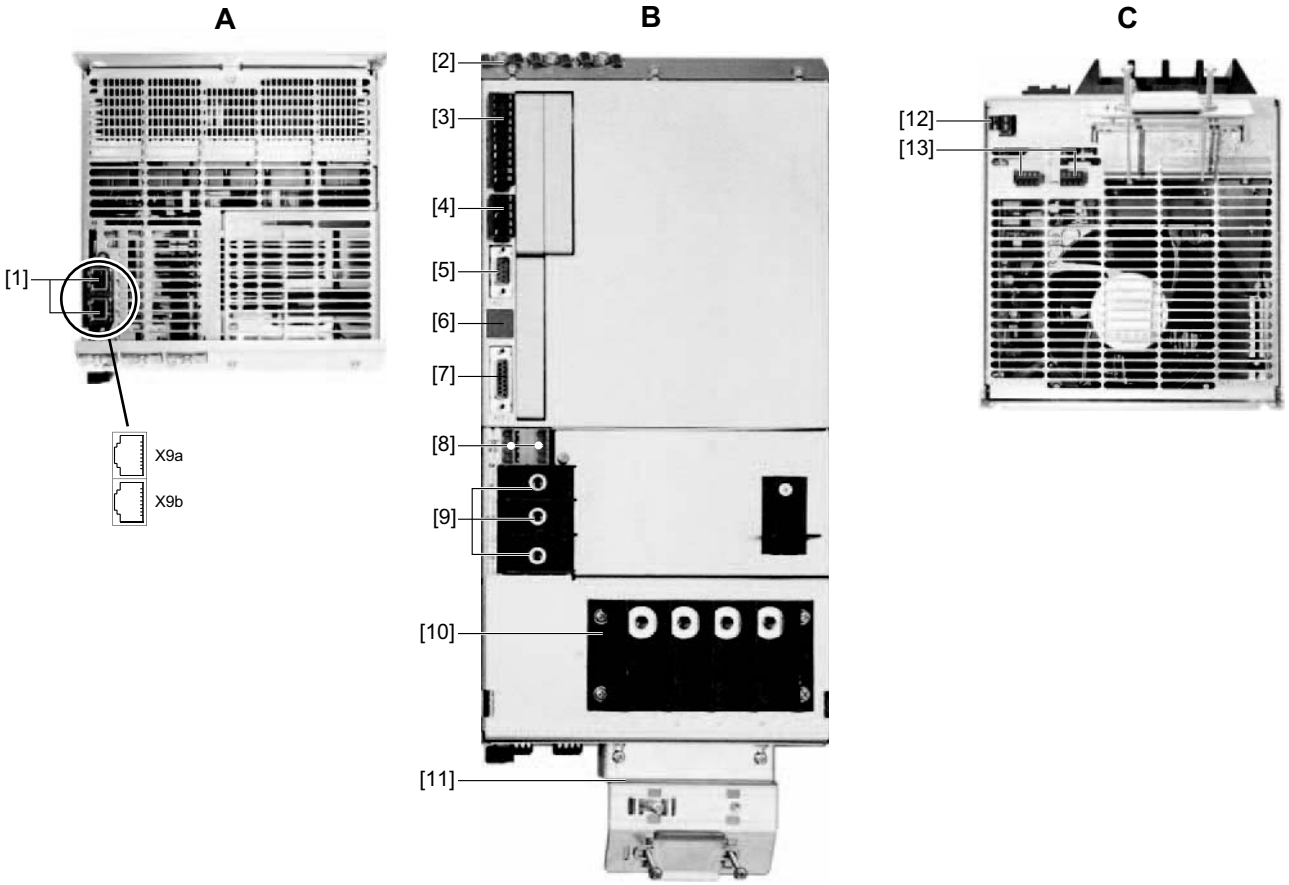
A	**View from top**
[1]	System bus X9a: Input, green plug on cable X9b: Output, red plug on cable

B	**View from front**
[2]	Electronics shield clamps
[3]	X10: Binary inputs
[4]	X11: Binary outputs
[5]	X12: CAN2 bus
[6]	2 x 7-segment display
[7]	X13 : Motor encoder connection (resolver or Hiperface® + temperature sensor)
[8]	X5a, X5b: 24 V voltage supply
[9]	X4: DC link connection
[10]	X2: Motor connection
[11]	Power shield clamp

C	**View from bottom**
[12]	X6: Brake control
[13]	X7, X8: 2 safety relays (optional variant)

3.10.6 MXA axis module, size 6



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A	**View from top**
[1]	System bus X9a: Input, green plug on cable X9b: Output, red plug on cable

B	**View from front**
[2]	Electronics shield clamps
[3]	X10: Binary inputs
[4]	X11: Binary outputs
[5]	X12: CAN2 bus
[6]	2 x 7-segment display
[7]	X13 : Motor encoder connection (resolver or Hiperface® + temperature sensor)
[8]	X5a, X5b: 24 V voltage supply
[9]	X4: DC link connection
[10]	X2: Motor connection
[11]	Power shield clamp

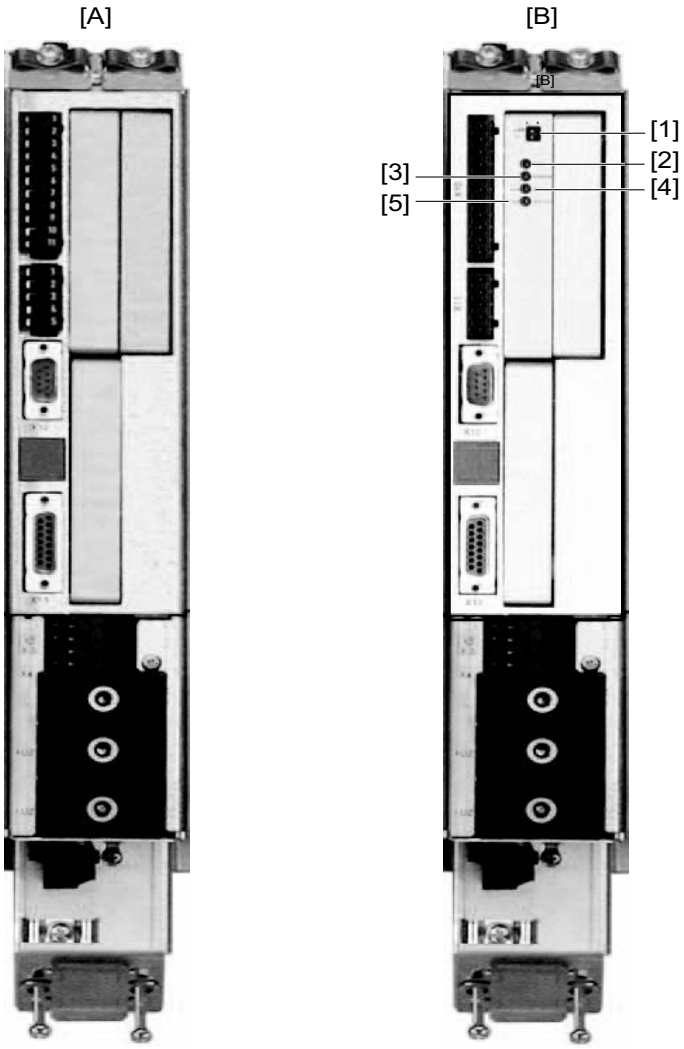
C	**View from bottom**
[12]	X6: Brake control
[13]	X7, X8: 2 safety relays (optional variant)

3.11 EtherCAT®-compatible or CAN-based system bus

Axis modules can be equipped with different system bus versions:

- CAN-based system bus, SBus,
- EtherCAT®-compatible system bus SBus^{plus}.

The illustrations in chapter "Unit design of MOVIAXIS® MXA axis modules" show the axis modules with CAN-based system bus SBus.



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[A] CAN-based system bus, SBus

[B] EtherCAT®-compatible system bus SBus^{plus}

[1] LAM switch
- Switch position 0: All axis modules except the last one
- Switch position 1: Last axis module in the system

Switch F1
- Switch position 0: Delivery state
- Switch position 1: Reserved for added functions

[2] LED RUN; color: Green/orange - Shows the operating status of the bus electronics and communication

[3] LED ERR; color: Red - Shows EtherCAT® error

[4] LED link IN; color: Green - EtherCAT® connection to the previous unit is active

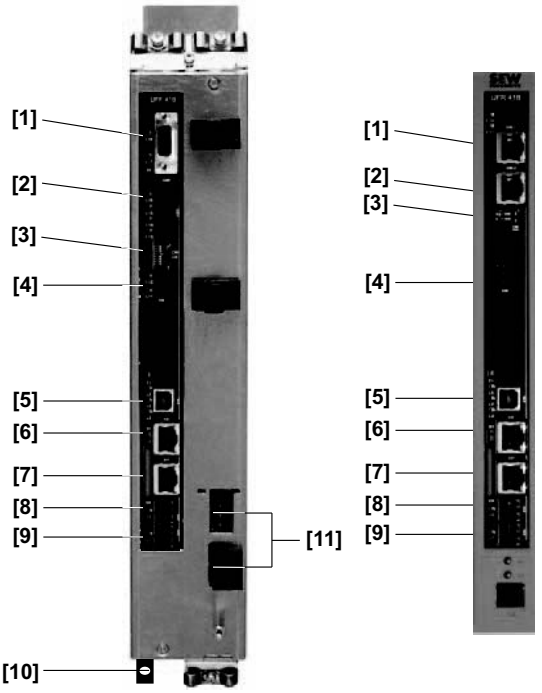
[5] LED link OUT; color: Green - EtherCAT® connection to the subsequent unit is active

3.12 Unit design of the MXM master module component

The following illustrations show the unit without protective cover.

3.12.1 MXM master module, gateway variant

The master module shown here has the following designation: MXM80A-000-000-00/ UF.41B.



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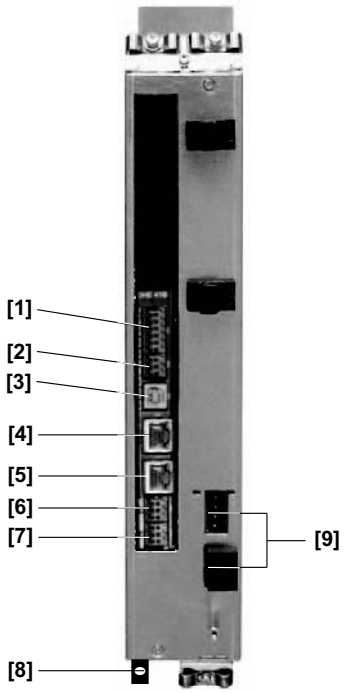
View from front

[1] – [9]	Terminal assignment listed in "UFR41B Fieldbus Gateway" and "UFF41B Fieldbus Gateway" manuals
[10]	Housing grounding point
[11]	X5a, X5b: 24 V voltage supply

3.12.2 MXM master module, variant with MOVI-PLC® *advanced*

The master module shown here has the following designation: MXM80A-000-000-00/ DHE41B.



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View from front

[1] – [7] For terminal assignment see "MOVI-PLC® *advanced* DH.41B Controller" manual

[8] Housing grounding point

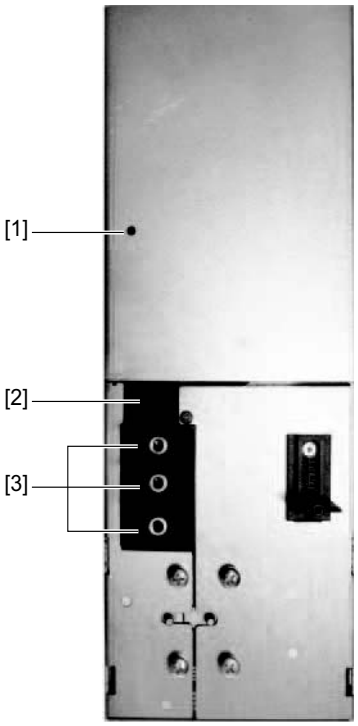
[9] X5a, X5b: 24 V voltage supply

	NOTICE
	Master module can be damaged. Only operate the master module when integrated in a system as described in chapter "Axis system overview" (page 24). Remote operation will damage the master module and is not permitted.

3.13 Unit design of the MXC capacitor module component

The following illustration shows the unit without protective cover.

3.13.1 Capacitor module MXC



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View from front

[1] Standby display (Power)

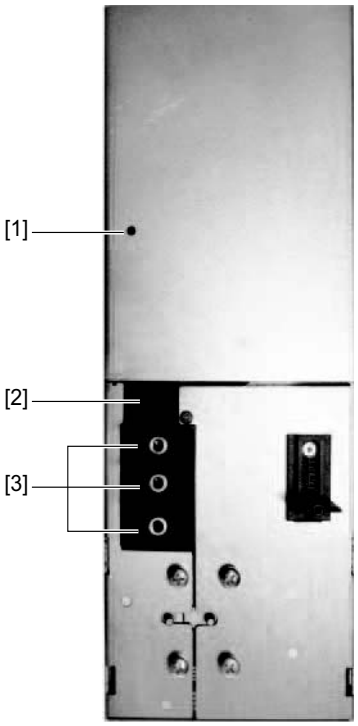
[2] X5a, X5b: 24 V voltage supply

[3] X4: DC link connection

3.14 Unit design of the MXB buffer module component

The following illustration shows the unit without protective cover.

3.14.1 Buffer module MXB



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View from front

[1] No function

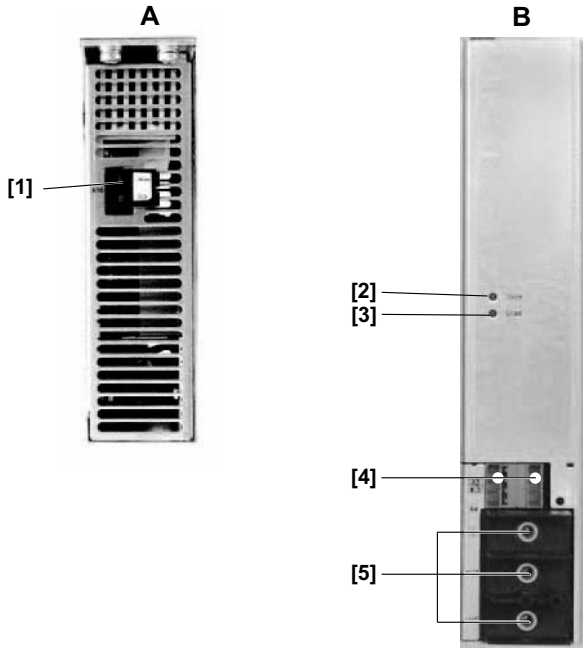
[2] X5a, X5b: 24 V voltage supply

[3] X4: DC link connection

3.15 Unit design of the MXS 24 V switched-mode power supply module component

The following illustration shows the unit without protective cover.

3.15.1 MXS 24 V switched-mode power supply module



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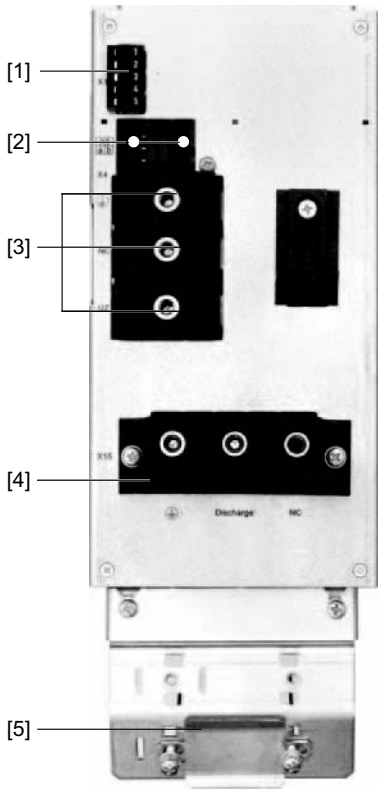
A	View from top	B	View from front
[1]	X16: 24 V external	[2]	LED State
		[3]	LED Load
		[4]	X5a, X5b: 24 V voltage supply
		[5]	X4: DC link connection

3.16 Unit design of the MXZ DC link discharge module component

The following illustration shows the unit without protective cover.

3.16.1 MXZ DC link discharge module



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View from front

[1] X14: Control connector
[2] X5a, X5b: 24 V voltage supply
[3] X4: DC link connection
[4] X15: Connection braking resistor for discharge
[5] Power shield clamp

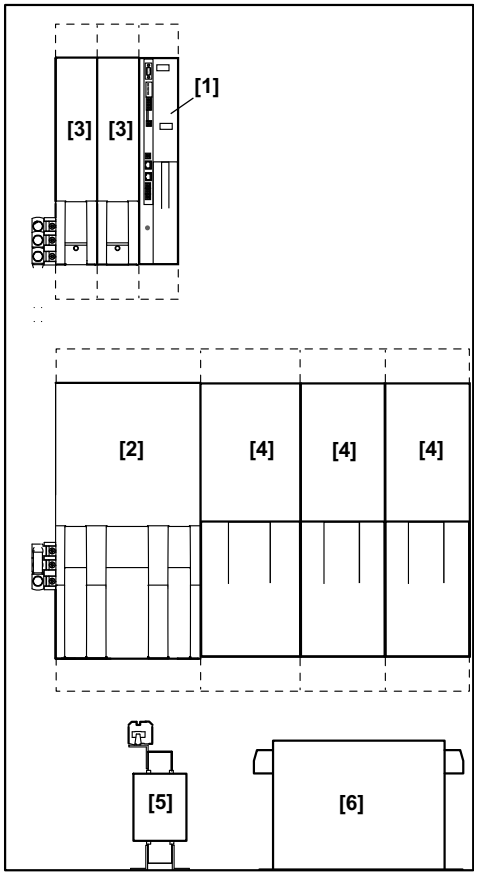
3.17 Combinable modules in case of two-row configuration of the axis system

The two-row configuration is only permitted with the units listed in these operating instructions.

	NOTICE
	Make sure to install as many MXA axis modules as possible in the lower row, before you install a maximum of 4 MXA axis modules of size 1 or 2 in the upper row. The maximum number of eight MXA axis modules per supply module must not be exceeded.

Combinable units:

The following figure shows an example of a two-row configuration for MOVIAXIS® modules.



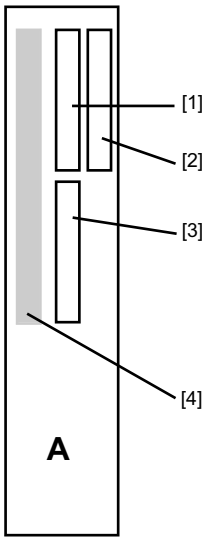
The following MOVIAXIS® modules can be combined:

- [1] One MXM master module,
- [2] One MXR supply and regenerative module, or one MXP supply module,
- [3] A maximum of 4 MXA axis modules of size 1 or size 2,
- [4] MXA axis modules of size 1 – 6,
- [5] One line choke for MXR,
- [6] One line filter for MXR.

The number and size of the modules are determined in project planning.

3.18 Option combinations on delivery

The axis modules include a rack system for up to 3 options.



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[1 – 3] Slots 1 - 3, assignment see following table

[4] Control board – component of the basic unit

A general distinction is made between whether MOVIAXIS® is used with the CAN-based system bus (SBus) or the EtherCAT®-compatible SBus^{plus}.

3.18.1 CAN version of the units

The following tables show the possible combinations and the fixed assignment of cards to the slots.

Fieldbus combinations

The fieldbus options can be plugged in the following combinations:

Combination	Slot 1	Slot 2	Slot 3
1	Fieldbus option[1)]		
2	XIO11A	Fieldbus option	
3			XIA11A
4			XGH
5			XGS
6			XIO11A
7	XIA11A		
8			XGH
9			XGS
10			XIA11A
11	Fieldbus option		XGH
12	XGS	Fieldbus option	
13	XGH		
14	Fieldbus option		XGS
15	XGS	Fieldbus option	

1) **XFE24A**: EtherCAT®; **XFP11A**: PROFIBUS; **XFA11A**: K-Net

Combinations with XIO

The options can be combined as follows:

Combination	Slot 1	Slot 2	Slot 3
1	XIO11A		
2		XIA11A	
3			XGH
4			XGS
5		XIA11A	XGH
6			XGS
7		XGS	XGH
8		XGH	
9		XGS	XGS
10		XIO11A	
11			XGH
12			XGS

Combinations with XIA

The options can be combined as follows:

Combination	Slot 1	Slot 2	Slot 3
1	XIA11A		
2			XGH
3			XGS
4		XGS	XGH
5		XGH	
6		XGS	XGS
7		XIA11A	
8			XGH
9			XGS

Combinations with XGH, XGS only

The options can be combined as follows:

Combination	Slot 1	Slot 2	Slot 3
1			XGH
2	XGS		
3	XGH		

Combinations with XGS only

The options can be combined as follows:

Combination	Slot 1	Slot 2	Slot 3
1			XGS
2	XGS		

3.18.2 EtherCAT®-capable units

The following table shows the possible combinations and the fixed assignment of cards to the slots.

Combinations with EtherCAT®-compatible system bus

The options can be combined as follows:

Combination	Slot 1	Slot 2	Slot 3
1	XSE24A		
2		XIO11A	
3			XIA11A
4			XGH
5			XGS
6			XIO11A
7		XIA11A	
8			XGH
9			XGS
10			XIA11A
11			XGH
12		XGS	
13		XGH	
14			XGS
15		XGS	

4 Installation

4.1 Mechanical installation

⚠ CAUTION

Do not install defective or damaged modules of the MOVIAXIS® MX multi-axis servo inverter as they can result in injuries or damage parts of the production system.

- Check the MOVIAXIS® MX multi-axis servo inverter modules prior to installing them for external damage and replace any damaged modules.

- Check to make sure that the delivery is complete.

NOTICE

The mounting plate in the control cabinet must be conductive over a large area for the mounting surface of the inverter system (metallically pure, good conductivity). An EMC compliant installation of the MOVIAXIS® MX multi-axis servo drive can only be accomplished with a mounting plate that is conductive over a large area.

- Mark the 4 bores for the retaining threads on the mounting platform (page 48) for each unit according to the table below. Make the bores with a tolerance according to ISO 2768-mK.
- The lateral distance between 2 axis systems must be at least 30 mm.
- Units within an axis system are mounted next to another without clearance.
- Cut the matching threads in the mounting platform and fasten the MOVIAXIS® MX multi-axis servo inverter with M6 screws. Screw head diameter from 10 mm to 12 mm.

The following table shows the dimensions for the unit housings of the modules viewed from the back.

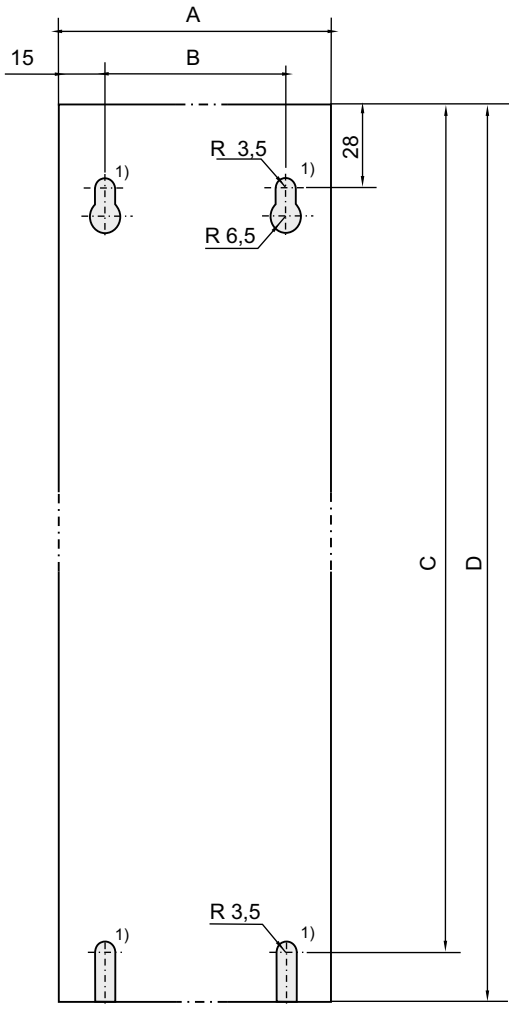
MOVIAXIS® MX	Rear view dimensions of MOVIAXIS® MX housing			
	A	B	C	D
	mm	mm	mm	mm
Axis module size 1	60	30	353	362.5
Axis module size 2	90	60	353	362.5
Axis module size 3	90	60	453	462.5
Axis module size 4	120	90	453	462.5
Axis module size 5	150	120	453	462.5
Axis module size 6	210	180	453	462.5
Supply module size 1	90	60	353	362.5
MXP81 supply module	120	90	353	362.5
Supply module size 2	90	60	453	462.5
Supply module size 3	150	120	453	462.5
Supply and regenerative module[1)]	210	180	453	462.5

Table continued on next page

MOVIAXIS® MX	Rear view dimensions of MOVIAXIS® MX housing			
	A	B	C	D
	mm	mm	mm	mm
Master module	60	30	353	362.5
Capacitor module	150	120	453	462.5
Buffer module	150	120	453	462.5
24 V switched-mode power supply module	60	30	353	362.5
DC link discharge module	120	90	288	297.5

1) For detailed information on the MXR supply and regenerative module, refer to the "MXR Supply and Regenerative Module" manual

4.1.1 Rear view of MOVIAXIS® module housing



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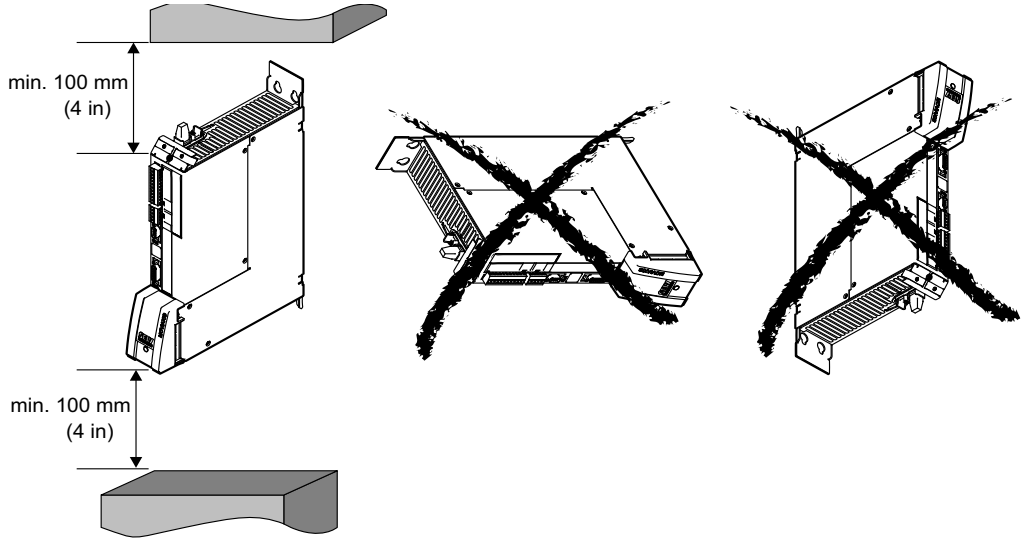
1) Position of tapped hole

2) See table with dimensions, see chapter "Mechanical installation" (page 47).

4.1.2 Minimum clearance and mounting position

- Leave at least **100 mm (4 in) clearance above and below the unit** for optimum cooling. Make sure air circulation in the clearance is not impaired by cables or other installation equipment.
- **Ensure unobstructed cooling air supply and make sure that the units are not subjected to heated air from nearby components.**
- Units within an axis system must be lined up without space in between.
- Only install the units **vertically**. You must not install them horizontally, tilted or upside down.



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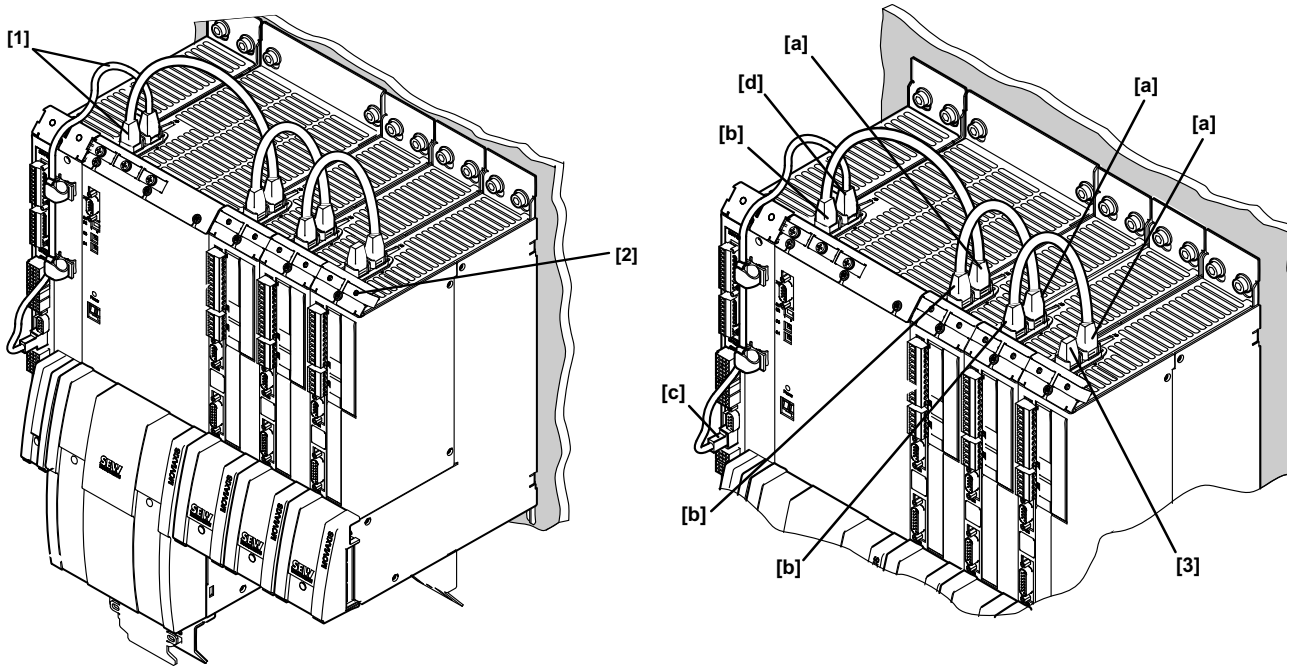
	NOTICE
	Special bending spaces are required according to EN 61800-5-1 for cables with a cross section of 10 mm^2 and larger. This means the clearance must be increased if required.

4.2 System bus cable for CAN-based system bus SBus with optional master module

The following describes how the system bus cables of the CAN system bus must be connected in the axis system.

- Insert the CAN system bus plugs **[1]** as described in the following (X9a, X9b):
  - The plugs on each end of the cable are color coded. Insert them in the following order: red (b)- green (a) - red (b) - green (a) - red (b) .....
    - red (b): Output (RJ45), X9b
    - green (a): Input (RJ45), X9a
    - black (c): MXM output (Weidmüller) (MOVI-PLC® *advanced*, UFX41 gateway)
    - black (d): MXP input (RJ45), X9a



	INFORMATION
	Important: Install a terminating resistor **[3]** in the last axis module of the axis system (included in the scope of delivery of the MXP and MXR supply modules).

4.2.1 Shield clamps

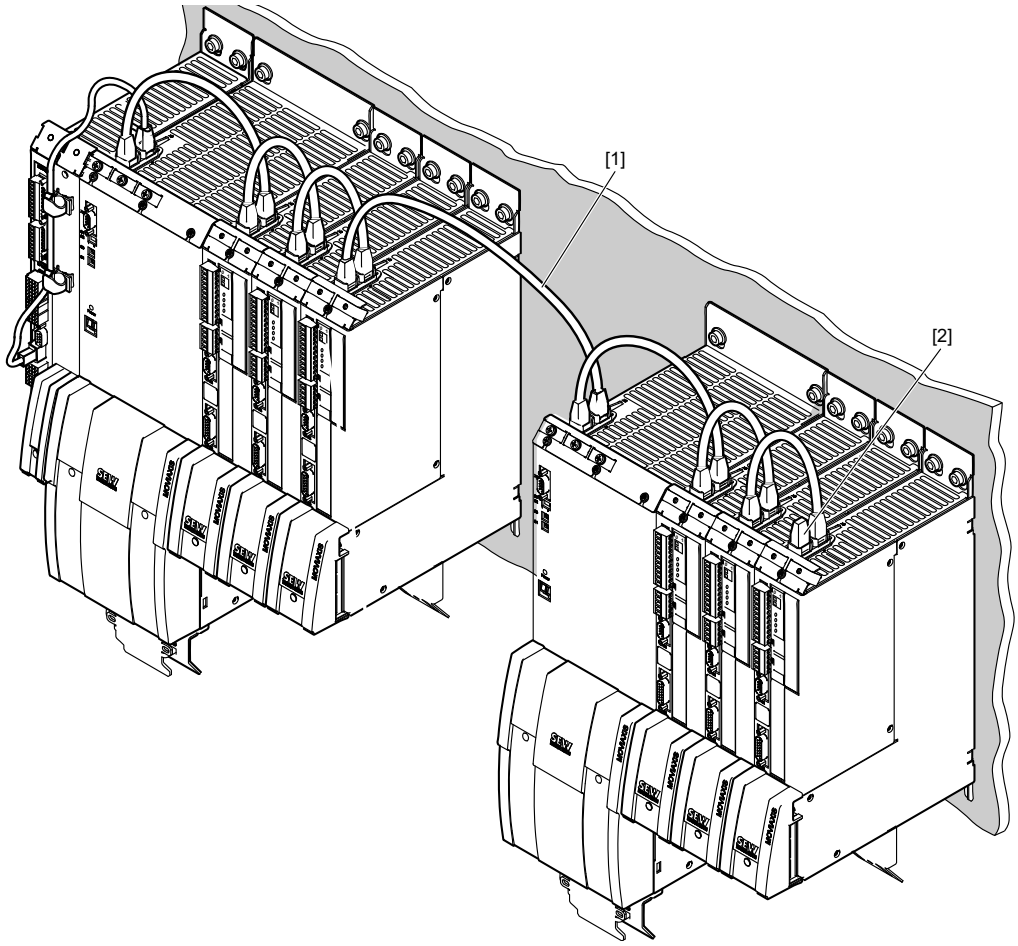
- Install the cables properly and screw on electronics shield clamps **[2]**.

4.3 System bus connection cable for several axis systems – CAN-based

- The individual axis systems are wired as described in chapter "Connection cable for CAN-based system bus with optional master module" (page 50).
- The CAN connection cable **[1]** is routed from the red output (X9b) of the last axis module in one axis system to the green input (X9a) of the first axis module of the subsequent system.

	INFORMATION
	The mounting plates on which the axis systems are mounted must have a sufficiently large ground connection, e.g. a ground strap.

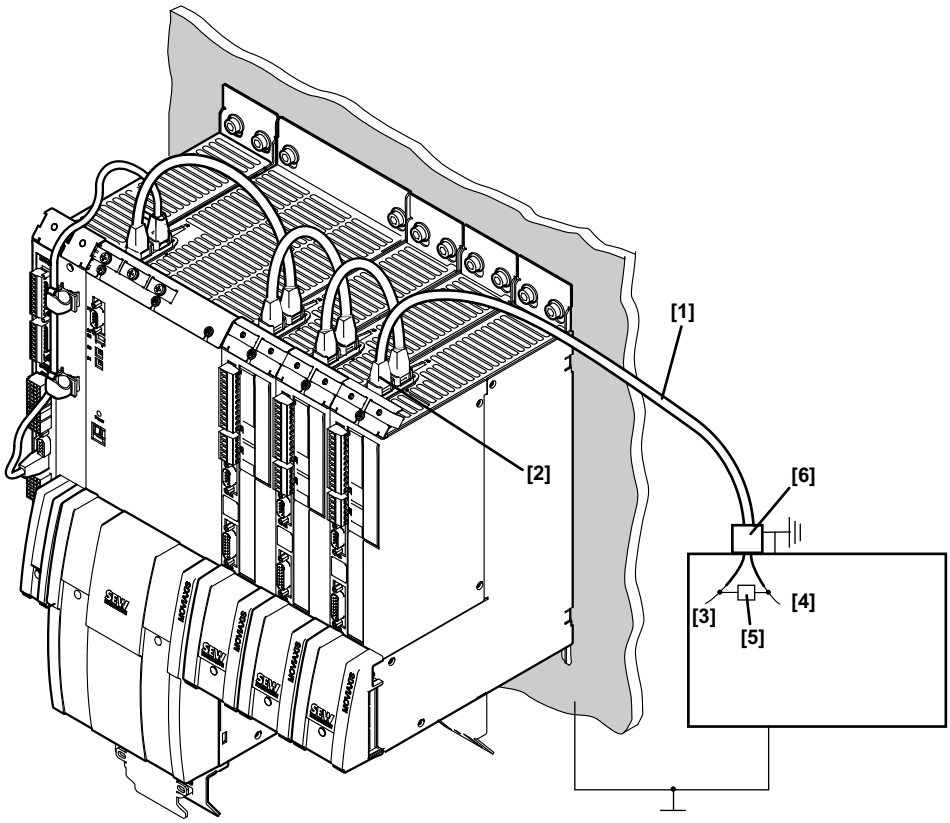
The lengths of the prefabricated system bus connection cables **[1]** are 0.75 m and 3 m.



[1] System bus connection cable [2] Terminating resistor

	INFORMATION
	Important: Install a terminating resistor **[2]** in the last axis module of the axis system (included in the scope of delivery of the MXP and MXR supply modules).

4.4 System bus connection cable to other SEW units – CAN-based



[1]	System bus connection cable	[4]	CAN H orange
[2]	Output plug black	[5]	Terminating resistor
[3]	CAN L orange-white	[6]	Contact shield connection

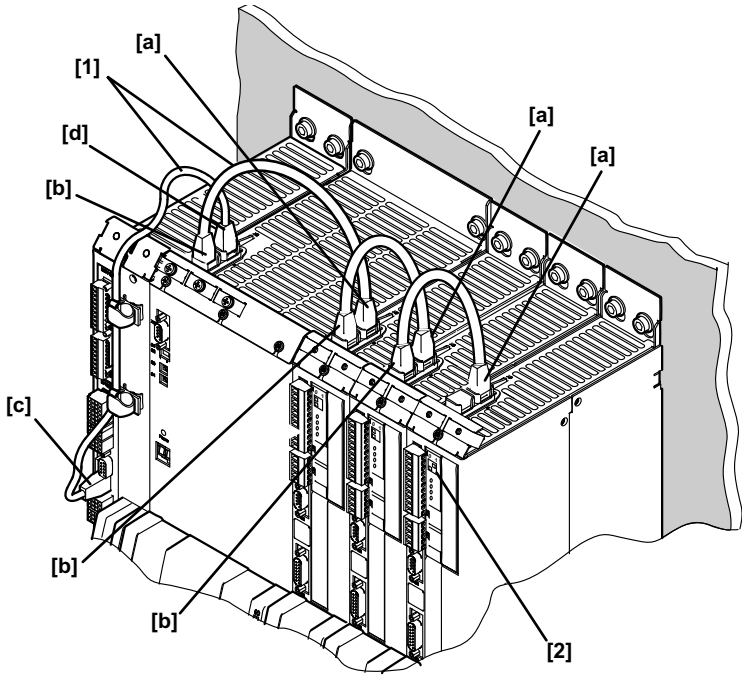
	INFORMATION
	Establish a common ground potential, e.g. connection of the 24 V ground of the supply voltages.

The lengths of the prefabricated connection cables **[1]** are 0.75 m and 3 m.

4.5 System bus cable for EtherCAT®-compatible system bus SBus^{plus} with master module

The following describes how the system bus cables of the EtherCAT®-compatible system bus SBus^{plus} must be connected in the axis system.

- Insert the system bus plugs **[1]** as described in the following (X9a, X9b):
  - The RJ-45 plugs on each end of the cable are color coded. Insert them in the following order: red (b)- green (a) - red (b) - green (a) - red (b) .....
    - red (b): Output (RJ45), X9b
    - green (a): Input (RJ45), X9a
    - yellow (c): MXM output (RJ45) (MOVI-PLC® *advanced*, UFX41 gateway)
    - black (d): MXP input (RJ45), X9a



[1] System bus cable

[2] LAM switch
- Switch position 0: All axis modules except the last one
- Switch position 1: Last axis module in the system

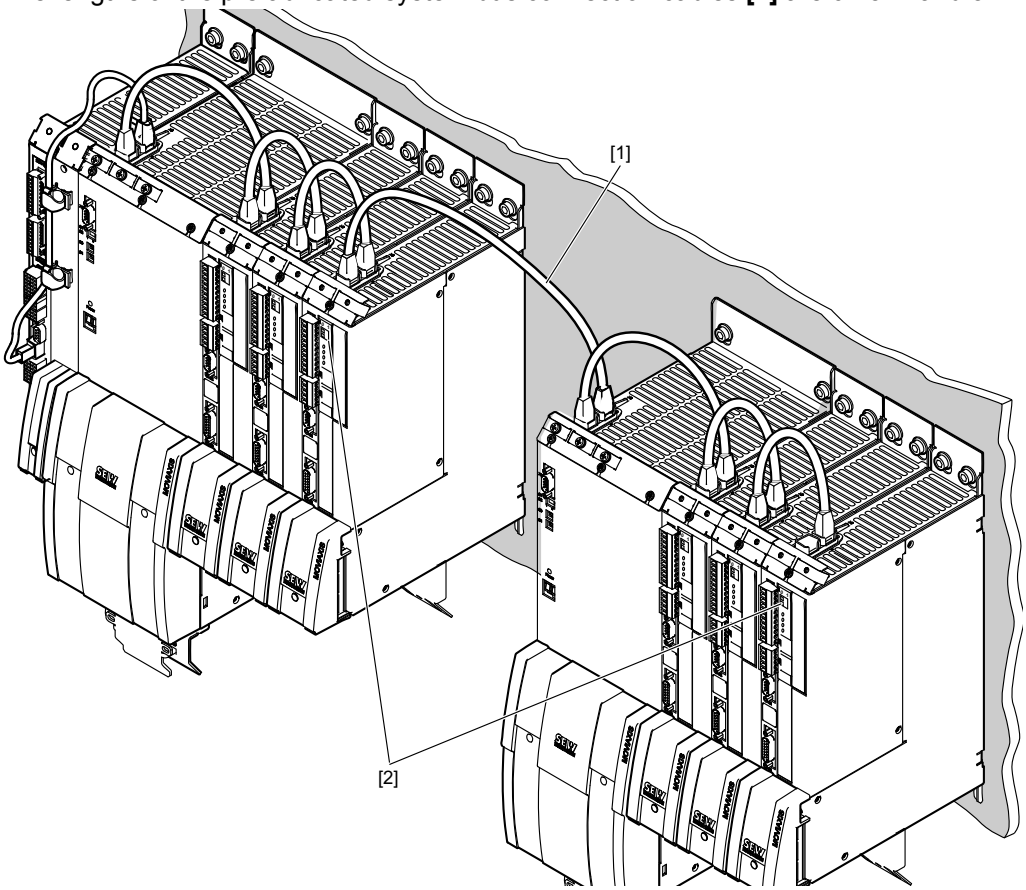
	INFORMATION
	The DIP switch LAM **[2]** must be set to "1" at the last axis module in a system. At all other axis modules, it must be set to "0".

4.6 System bus cable for several axis systems – EtherCAT®-compatible

- The individual axis systems are wired as described in chapter "Connection cable for EtherCAT-compatible system bus with master module" (page 53).
- The connection cable **[1]** is routed from the yellow output (b) of the last axis module in one axis system to the black input (a) of the first axis module of the subsequent system.

	INFORMATION
	The mounting plates on which the axis systems are mounted must have a sufficiently large ground connection, e.g. a ground strap.

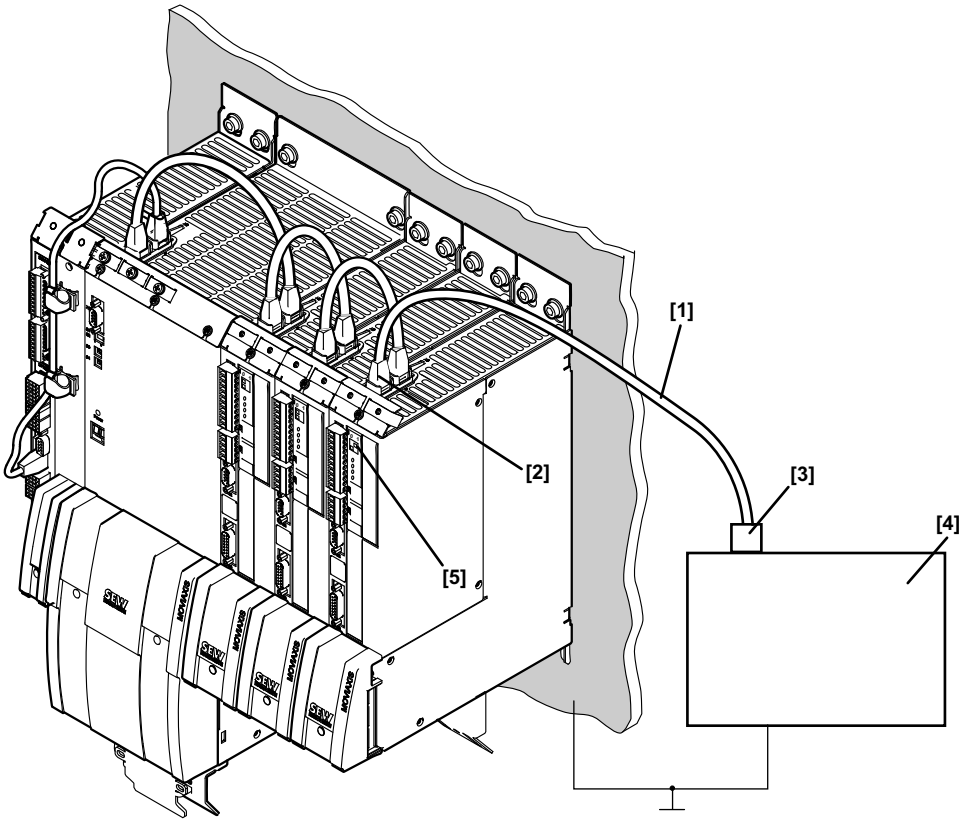
The lengths of the prefabricated system bus connection cables **[1]** are 0.75 m and 3 m.



[1] System bus connection cable [2] LAM switch
- Switch position 0: All axis modules except the last one
- Switch position 1: Last axis module in the system

	CAUTION
	The DIP switch LAM **[2]** must be set to "1" at the last axis module in each system. At all other axis modules, it must be set to "0".

4.7 System bus connection cable to other SEW units – EtherCAT®-compatible



[1] System bus connection cable
[2] Output plug yellow
[3] Input plug green, RJ45
[4] SEW stations with SEW EtherCAT® interface
[5] LAM switch
- Switch position 0: All axis modules except the last one
- Switch position 1: Last axis module in the system

	CAUTION
	Important: The DIP switch LAM **[5]** must be set to "1" at the last axis module in a system. At all other axis modules, it must be set to "0".

The lengths of the prefabricated connection cables **[1]** are 0.75 m and 3 m.

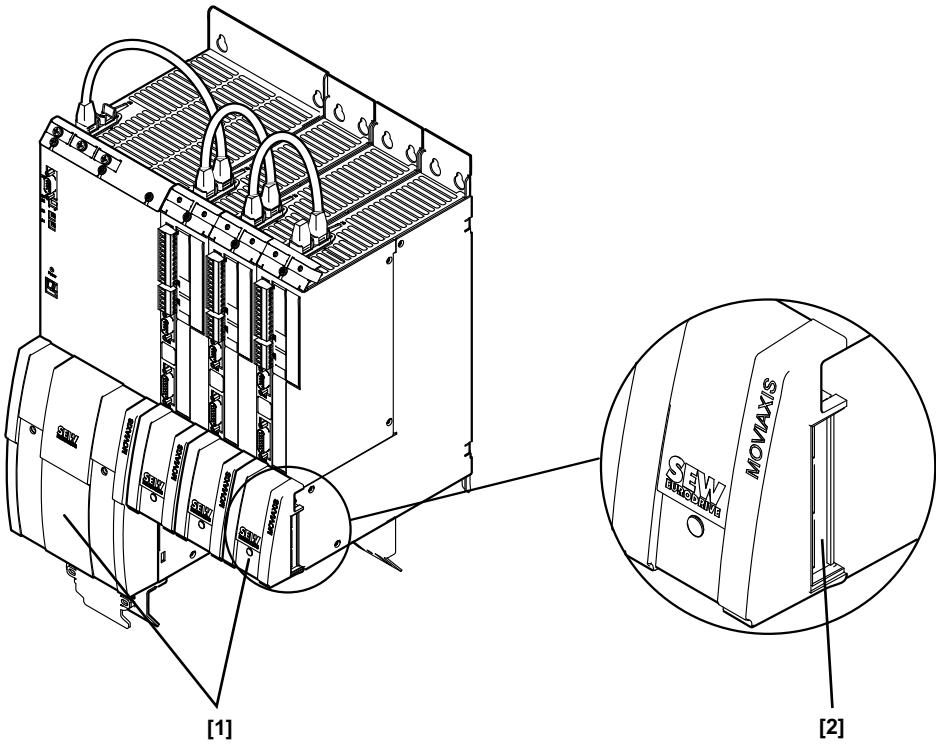
	CAUTION
	Use only prefabricated cables from SEW-EURODRIVE (special assignment) for this connection.

4.8 Covers and touch guards

4.8.1 Protection cover

The following units come equipped with a protection cover:

- Master module (not shown),
- Capacitor module (not shown),
- Buffer module (not shown),
- Damping module (not shown),
- Supply module; all sizes,
- Supply and regenerative module (not shown),
- Axis module; all sizes.
- 24 V switched-mode power supply module (not shown),
- DC link discharge module; all sizes, (not shown).



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[1] Extended fan guard
[2] Touch guard

The tightening torque for the cover bolts is 0,8 Nm.

When driving in the self-tapping screw, make sure that it screws into the existing thread.

4.8.2 Touch guard

⚠ WARNING

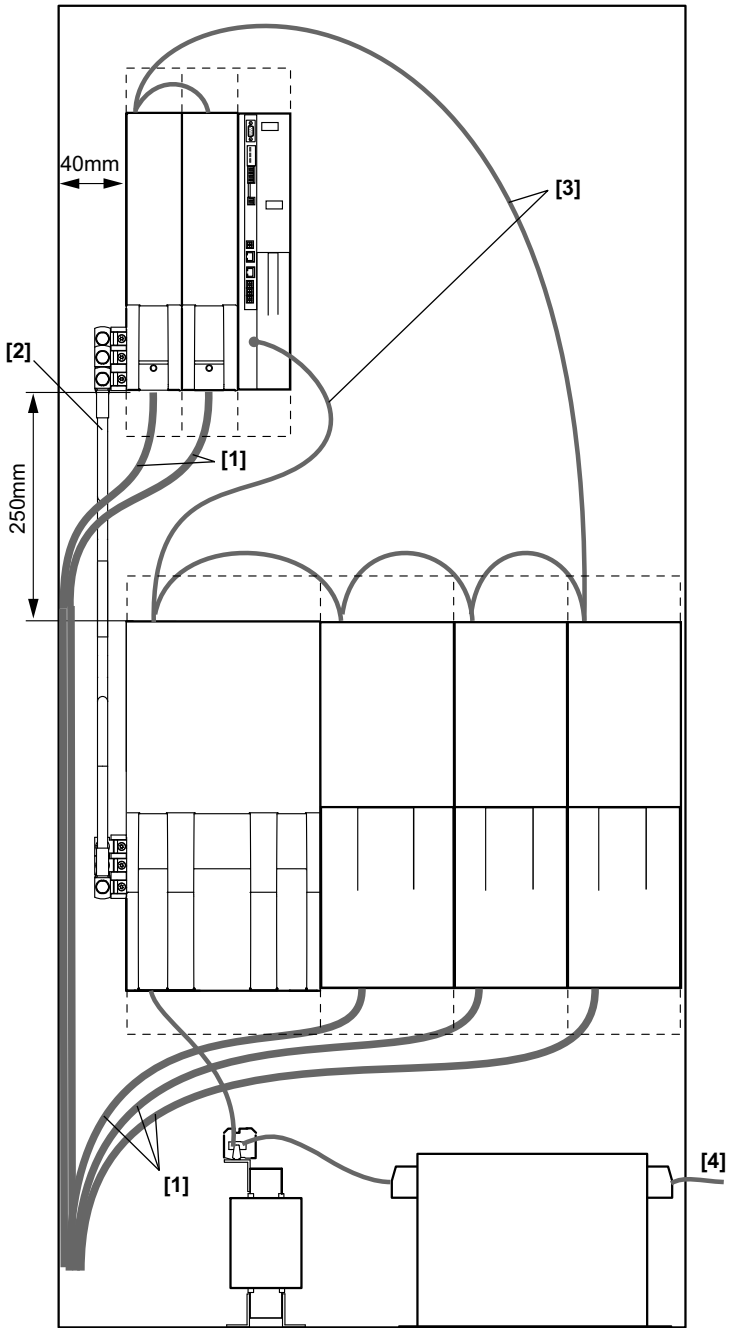
Touch guard covers not installed.

Severe or fatal injuries from electric shock.

- The touch guard covers have to be installed on the left-hand and right-hand side of the axis system so that there is no risk of touching any electrically conductive parts.

Two touch guard covers are included with each supply module.

4.9 Two-row configuration of the axis system – mechanical installation



[1] Motor leads

[2] Cables for DC link connection

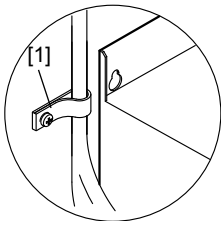
[3] Signal bus cable

[4] Supply system cable

The following requirements must be met for installation in a control cabinet:

- Ensure a clearance of at least 40 mm left of the axis blocks for routing the DC link connection [2] and the motor leads [1] through, see illustration on the previous page.
- Provide a clearance of 250 mm between the axis blocks (see illustration on previous page) for using the prefabricated DC link connection cables. The prefabricated DC link connection cables are included in the scope of delivery and must be used.
- Route the motor leads [1] on the left side of the axis blocks to the bottom, see illustration on the previous page.

  Note: Do not install any units, components, etc. on the left control cabinet wall that protrude into the control cabinet and restrict the space for routing the motor leads and DC link connection cables.
- Route signal bus cables and power cables separately from each other, see illustration on previous page.
- Use suitable means to attach the DC link connection in order to prevent mechanical vibrations, e.g. a clamp [1]. Also see the illustration in chapter "Two-row configuration of the axis system – electrical installation" (page 64). Consider any oscillations and vibrations, especially in mobile control cabinets.



- SEW-EURODRIVE recommends installing line filters and the line choke of the supply and regenerative module at the bottom of the control cabinet due to their great weight, see illustration on previous page.
- Attach both protection caps to the insulators, see illustration in chapter "Two-row configuration of the axis system – electrical installation" (page 64).

4.10 Electrical installation

DANGER

Dangerous voltage levels may still be present inside the unit and at the terminal strips up to 10 minutes after the complete axis system has been disconnected from the supply system.

Severe or fatal injuries from electric shock.

To prevent electric shocks:

- Disconnect the axis system from the supply system and wait ten minutes before removing the covers.
- After maintenance work, do not operate the axis system unless you have replaced the protection covers, touch guard (page 56) because the unit only has degree of protection IP00 without protection cover.

DANGER

A leakage current > 3.5 mA can occur during operation of the MOVIAXIS® MX multi-axis servo inverter.

Severe or fatal injuries from electric shock.

To prevent electric shock:

- With a supply system lead < 10 mm^2, route a second PE conductor with the same cross section as the supply system lead via separate terminals. Alternatively, you can use a PE conductor with a copper cross section ≥ 10 mm^2 or aluminum ≥ 16 mm^2.
- With an incoming supply line ≥ 10 mm^2, it is sufficient to install a PE conductor with a copper cross section ≥ 10 mm^2 or aluminum ≥ 16 mm^2.
- If an earth leakage circuit breaker can be used for protection against direct and indirect contact, it must be universal current sensitive (RCD type B).

INFORMATION

Installation with reliable isolation.

The unit meets all requirements for reliable isolation between power and electronic connections according to EN 61800-5-1. The connected signal circuits have to meet the requirements according to SELV (**S**afety **E**xtra **L**ow **V**oltage) or PELV (**P**rotective **E**xtra **L**ow **V**oltage) to ensure reliable isolation. The installation must meet the requirements for reliable isolation.

4.10.1 Temperature sensor in the motor

⚠ WARNING

Dangerous contact voltages at the unit terminals when connecting the wrong temperature sensors.

Severe or fatal injuries from electric shock.

- Connect only temperature sensors with reliable isolation from the motor winding to the temperature evaluation. Otherwise, the requirements for reliable isolation are not met. Dangerous contact voltages may occur at the unit terminals via the signal electronics in case of an error.

4.10.2 Line and brake contactors

- Only use mains and brake contactors in **utilization category AC-3** (EN 60947-4-1) or a better category.
- Line cable: **Cross section according to nominal input current** I_{line} at nominal load.
- Motor lead: **Cross section according to nominal output current** I_N.
- Electronics cables:
  - 1 core per terminal 0.20 – 1.5 mm^2
  - 2 cores per terminal 0.25 – 1.5 mm^2
- Do not use the K11 relay for jog mode, but only for switching the servo inverter on/off. Use the FCB "Jog" for jog mode.

CAUTION

- Observe a minimum switch-off time of 10 s for the relay K11.
- **Do not** turn the power on or off **more than once per minute**!
- The line contactor must always be positioned before the line filter.

4.10.3 Line fuse types

Line protection types in operation classes gL, gG:

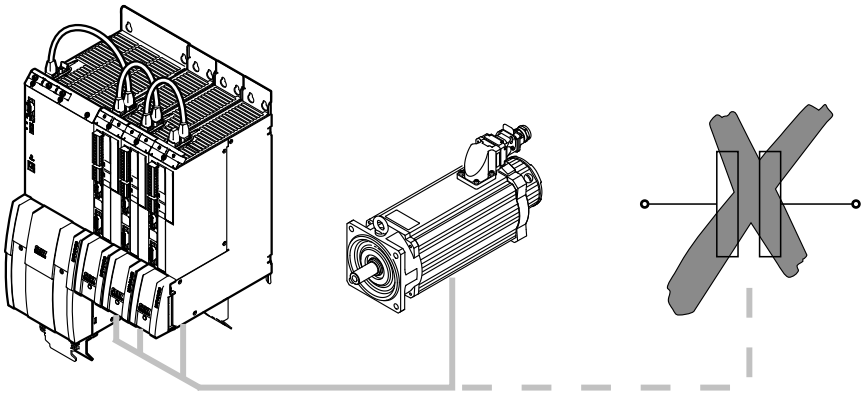
- Nominal fusing voltage ≥ nominal line voltage

Circuit breakers with characteristics B, C and D:

- Nominal circuit breaker voltage ≥ nominal line voltage
- Nominal circuit breaker currents must be 10 % above the nominal line current of the supply module.

4.10.4 Unit output

	NOTICE
	An axis module can suffer irreparable damage if you connect capacitive loads to it. • **Only connect ohmic/inductive loads (motors).** • Never connect capacitive loads.



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4.10.5 Binary inputs/binary outputs

- The **binary inputs** are electrically **isolated** by optocouplers.

	NOTICE
	The **binary outputs** are **short-circuit proof** but **not interference-voltage-proof**. Externally applied voltages can damage the binary outputs.

- The maximum cable length on the input and output connections must not exceed 10 m.
- If you route the cables outside the control cabinet, you have to shield them irrespective of the length.

4.10.6 Permitted voltage supply systems

- MOVIAXIS® is intended for operation on voltage supply systems with a directly grounded star point (TN and TT power systems). Operation on voltage supply systems with a non-grounded star point (for example IT power systems) is permitted. In such a case, SEW-EURODRIVE recommends using earth-leakage monitors employing pulse-code measurement. Use of such devices prevents the earth-leakage monitor mis-tripping due to the earth capacitance of the servo inverter.
- No EMC limits are specified for interference emission in voltage supply systems without a grounded star point (IT systems). The efficiency of line filters is severely limited.

4.10.7 Connecting the units

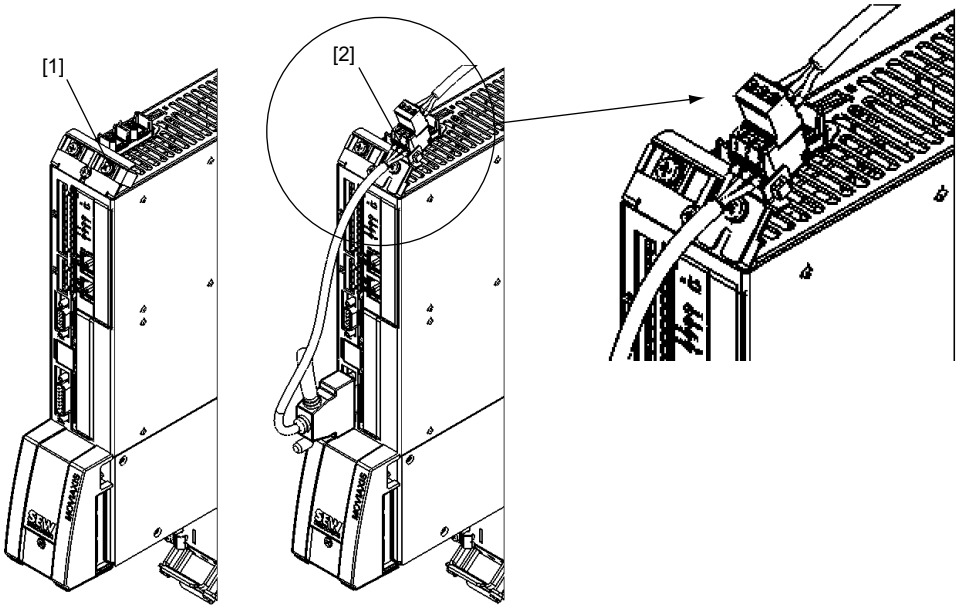
- Connect the supply terminals of all units in the MOVIAXIS® MX axis system according to the respective wiring diagrams in chapter "Wiring diagrams" (page 67).
- Check to see that the assignment of multi-axis servo drive and motor is correct according to project planning specification.
- Check to see that all grounding cables have been connected.
- Take suitable measures to prevent the motor starting up inadvertently, for example by removing the electronics terminal block X10 on the axis module. Integrate additional safety features for certain applications to prevent possible injuries and damages to machines.
- Only use closed cable lugs for connection to the screw bolt in order to prevent litz strands from escaping.

4.10.8 Additional terminal when using TF/TH motor protection for asynchronous motors

When operating asynchronous motors on MOVIAXIS®, the TF/TH motor protection is not routed in the encoder cable but as separate cable from the connector.

In this case, an assembly kit with connection plug is available that is mounted to the axis module instead of the cable clamp on the shield plate.

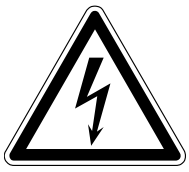
Installation



- Remove the cable clamp on the shield plate [1]
- Mount the TF/TH assembly kit with the connection plug [2]
- Attach the TF/TH connection cable as shown and connect it [3]

4.10.9 Two-row configuration of the axis system – electrical installation

- The routing of cables described in chapter "Two-row configuration of the axis system – mechanical installation" (page 58) must be observed:
  - Route the motor leads of the upper row on the left side,
  - Route the signal cables separately from the power cables.



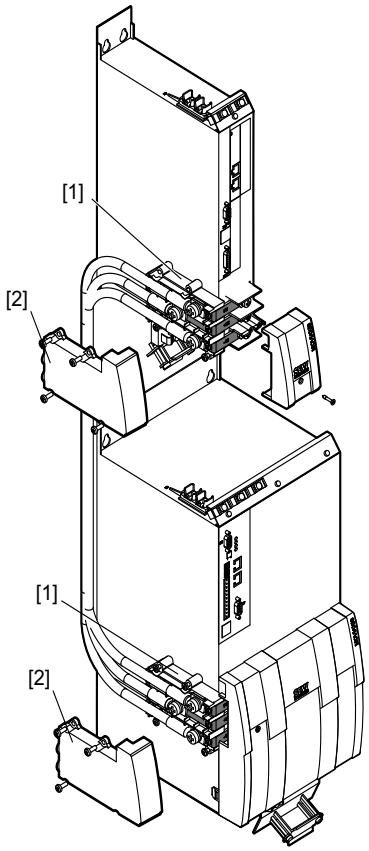
⚠ DANGER

Dangerous voltages (DC 970 V) at cables and insulators [1].

Severe or fatal injuries from electric shock.

To prevent electric shocks:

- Disconnect the axis system from the supply system and wait ten minutes before removing the covers.
- Use suitable measuring instruments to make sure that no voltage is present at cables and insulators [1].
- After maintenance work, do not operate the axis system unless you have replaced the protection covers, touch guard (page 56) and the two protection caps for two-row configuration [2] because the unit only has degree of protection IP00 without protection cover.



[1] Insulators

[2] Protection caps

4.11 Braking resistors

4.11.1 Permitted mounting the braking resistors

⚠ WARNING

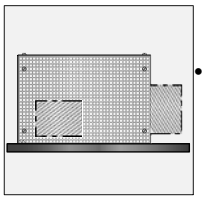
Non-permissible installation might lead to an accumulation of heat in the braking resistor due to reduced convection. A tripping temperature contact or an overheated braking resistor can lead to a system standstill.

Adhere to the following minimum distances:

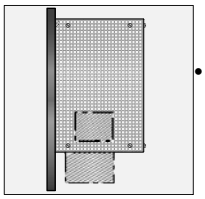
- About 200 mm to adjacent components and walls
- About 300 mm to above components/ceilings

Grid resistors

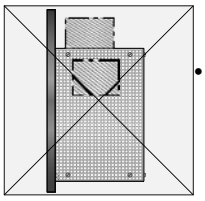
You must fulfill the following requirements for mounting the grid resistors:



- **Permitted**: Mounting on horizontal surfaces.



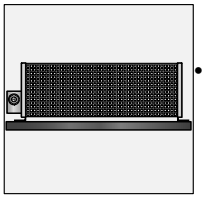
- **Permitted**: Mounting on vertical surfaces with terminals pointing downwards when there is a perforated sheet at the top.



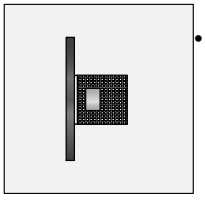
- **Not permitted**: Mounting on vertical surfaces with terminals pointing upwards, to the right or left. (The connection terminals can be placed within the steel grid, where appropriate. Ensure the proper position of connection terminals also in this case).

Wire resistors

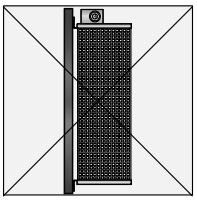
You must fulfill the following requirements for mounting the wire resistors:



- **Permitted**: Mounting on horizontal surfaces.



- **Permitted**: Mounting on vertical surfaces when there is a perforated sheet at the top or connection terminals at the bottom



- **Not permitted**: Mounting on vertical surfaces when the connection terminals are at the top.

4.11.2 Connection of braking resistors

- SEW-EURODRIVE recommends to connect the braking resistor as shown in the wiring diagrams in chapter "Brake control" (page 75). Install switch F16 close to the unit network. If an unshielded cable is used for connecting switch F16 with the supply module, keep the length as short as possible. Preferably use a shielded line cable or twisted individual lines as connection cable to the braking resistor. The cross section must be selected depending on the nominal current of the braking resistor.
- When using an external **overload relay (page 74)**, set the **trip current** according to the **technical data of the braking resistor (type BW... and BW...-01)**.
- Observe the notes in the "UL-compliant installation" (page 126) chapter.

4.11.3 Operation of braking resistors

- The connection leads to the braking resistors carry a **high DC voltage of about 900 V** during nominal operation.

⚠ WARNING

The surfaces of the braking resistors will reach temperatures of up to 250 °C when the braking resistors are loaded with P_N.

Risk of burns and fire.

- Choose a suitable installation location. Braking resistors are usually mounted on top of the control cabinet.
- Do not touch any braking resistor.

4.12 Wiring diagrams

4.12.1 General notes on the wiring diagrams

- For technical data of the connections of power electronics and control electronics, refer to chapter "Technical Data" (page 233).
- All units within the axis system have to be connected to each other via the DC link bus connection (PE, + U_Z, - U_Z), the 24 V voltage supply (X5a, X5b) and the system bus (X9a, X9b).
- The line contactor "K11" must be installed between the supply system and the line filter.

	INFORMATION
	• Connect the brake rectifier (option) using a separate supply system lead. • Supply via the motor voltage is not permitted.

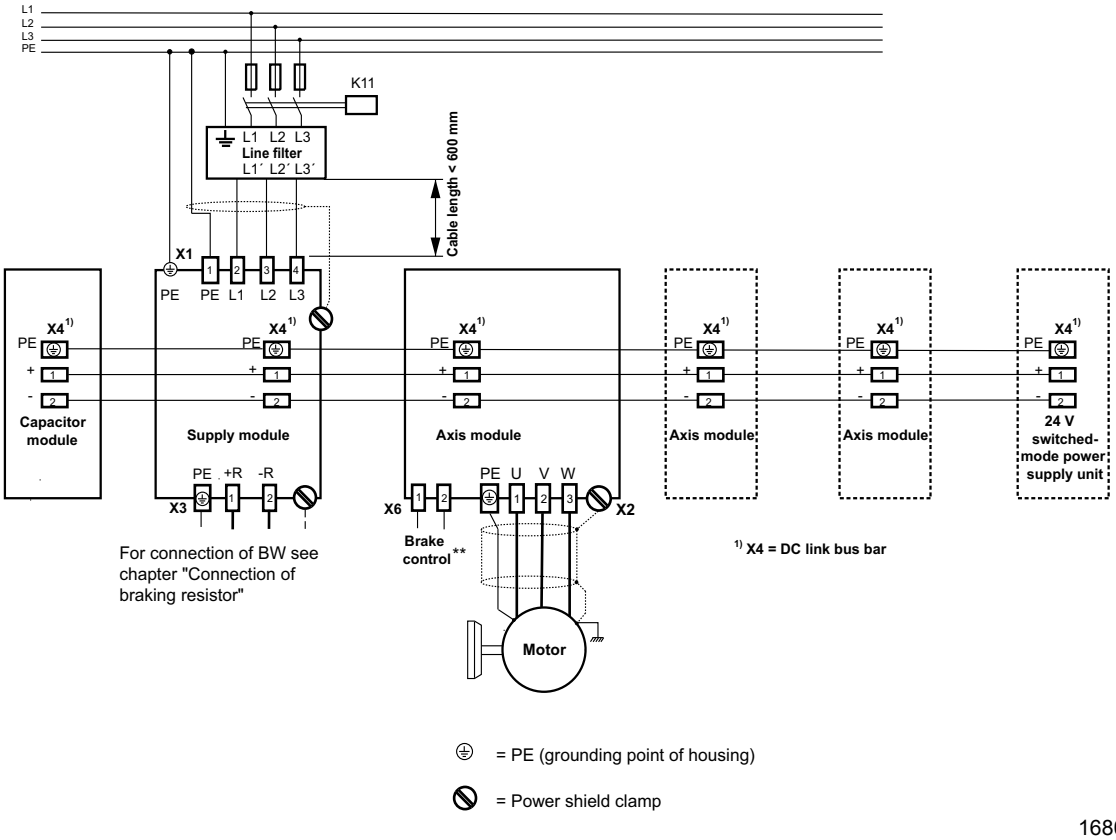
	INFORMATION
	• If the brake connection and the motor connection are combined in one power cable, the brake line must be shielded separately. The shielding of the power cable and the brake cable must be connected with PE on the motor and servo inverter. • Use a shielded cable as brake cable with separate installation of the brake cable. • Note the different project planning criteria to determine the length of brake cable and motor cable.

Brake rectifier in the control cabinet

Install the connection cables between the brake rectifier and the brake separately from other power cables when installing the brake rectifier in the control cabinet. Joint installation is permitted with shielded power cables only.

4.12.2 Connection of supply module, axis module, and capacitor or buffer module

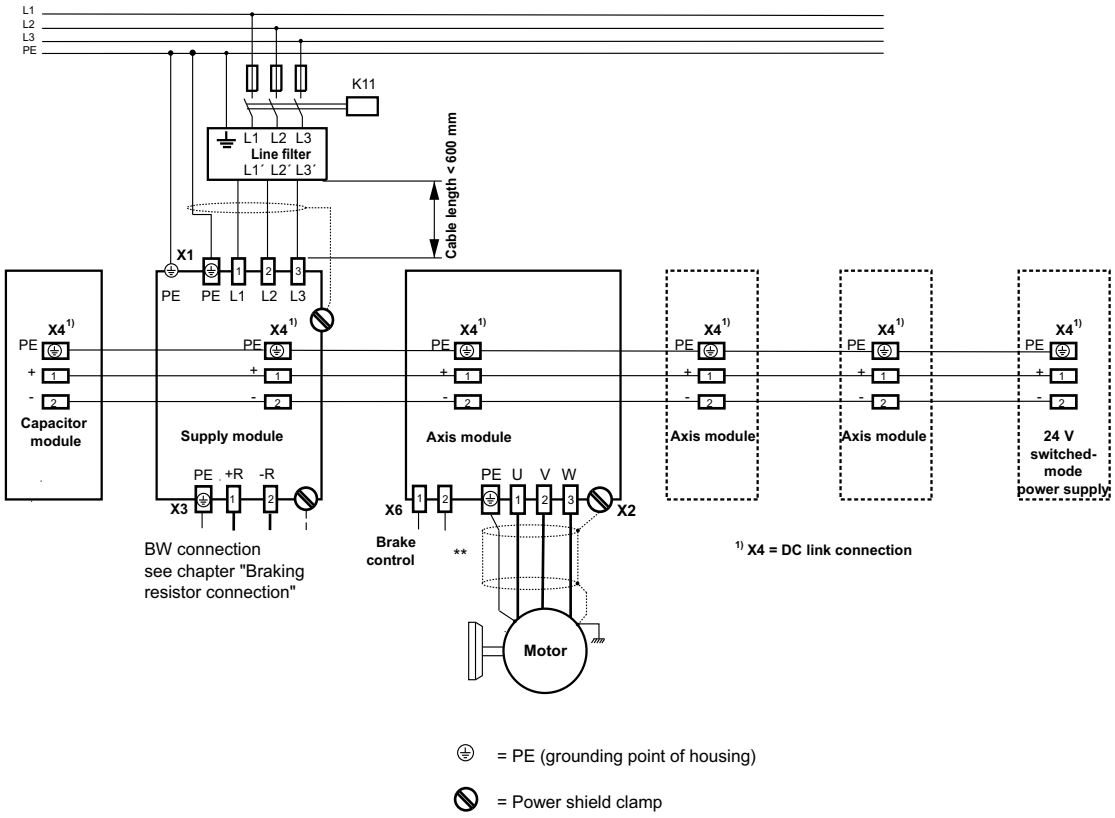
Wiring of power terminals MXP80.. Size 1 and 2



1680410891

** Make sure to provide separate isolation for the brake lines when controlling the brakes with 24 V. We recommend using SEW hybrid cables that offer complete shielding with shielding supports as well as separate shielding for the brake line.

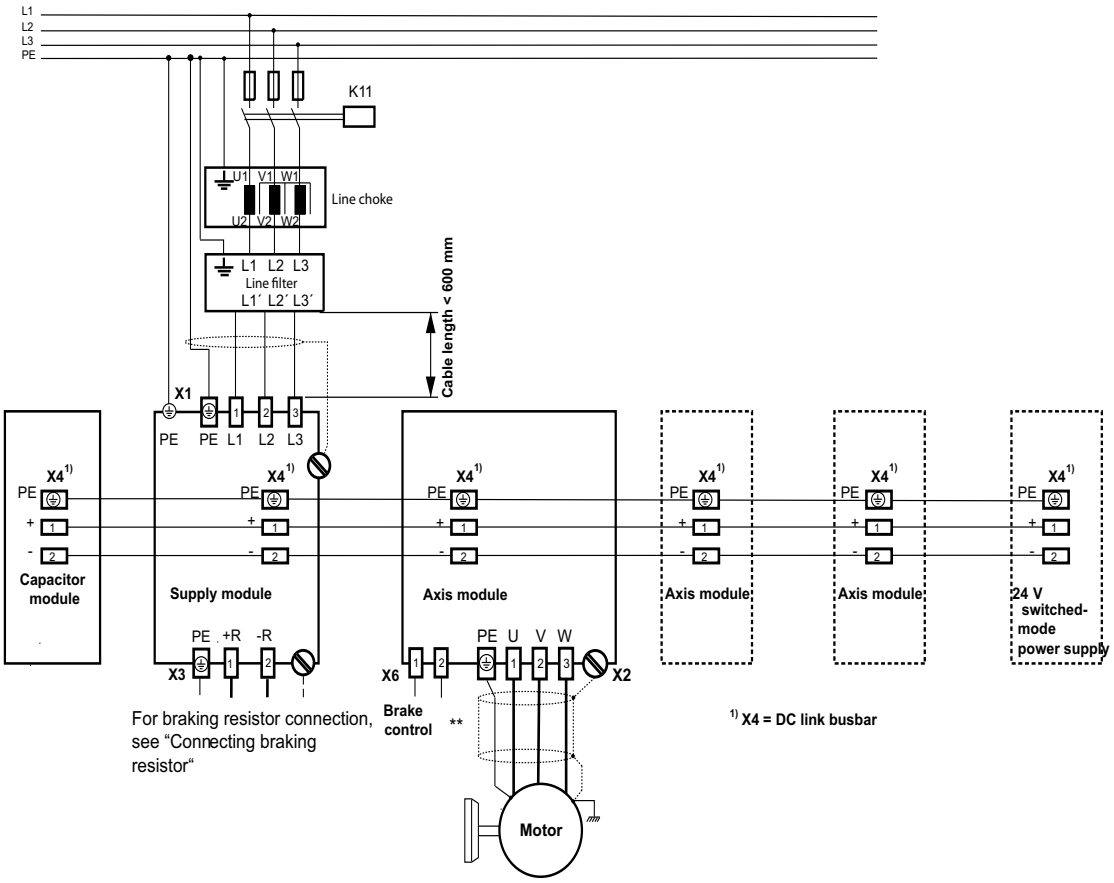
Wiring of power terminals MXP80.. Size 3



1406099211

****** Make sure to provide separate isolation for the brake lines when controlling the brakes with 24 V. We recommend using SEW hybrid cables that offer complete shielding with shielding supports as well as separate shielding for the brake line.

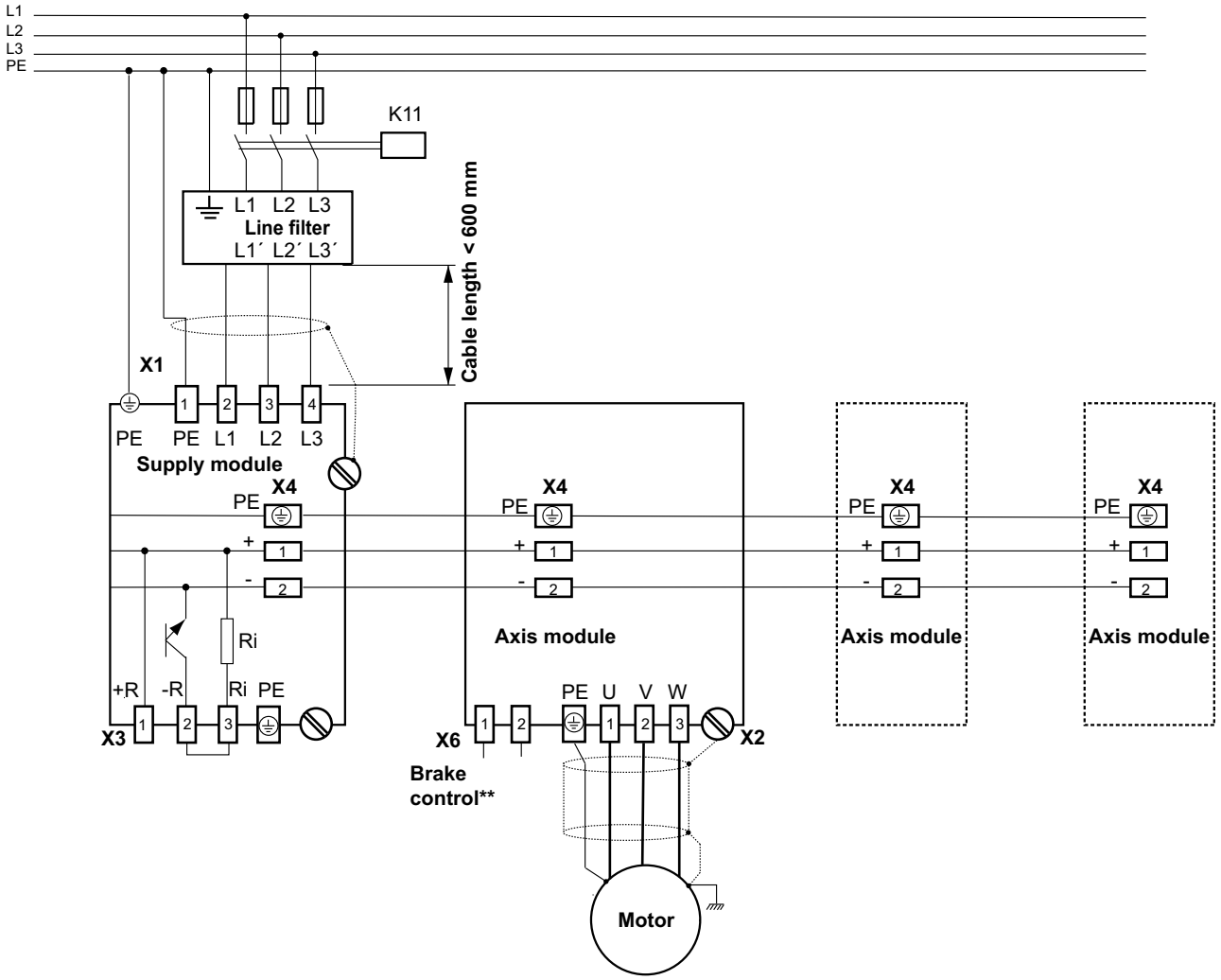
Wiring of power terminals MXP80.. BG3 for example with line filter and line choke



3945067275

****** Make sure to provide separate isolation for the brake lines when controlling the brakes with 24 V. We recommend using SEW hybrid cables that offer complete shielding with shielding supports as well as separate shielding for the brake line.

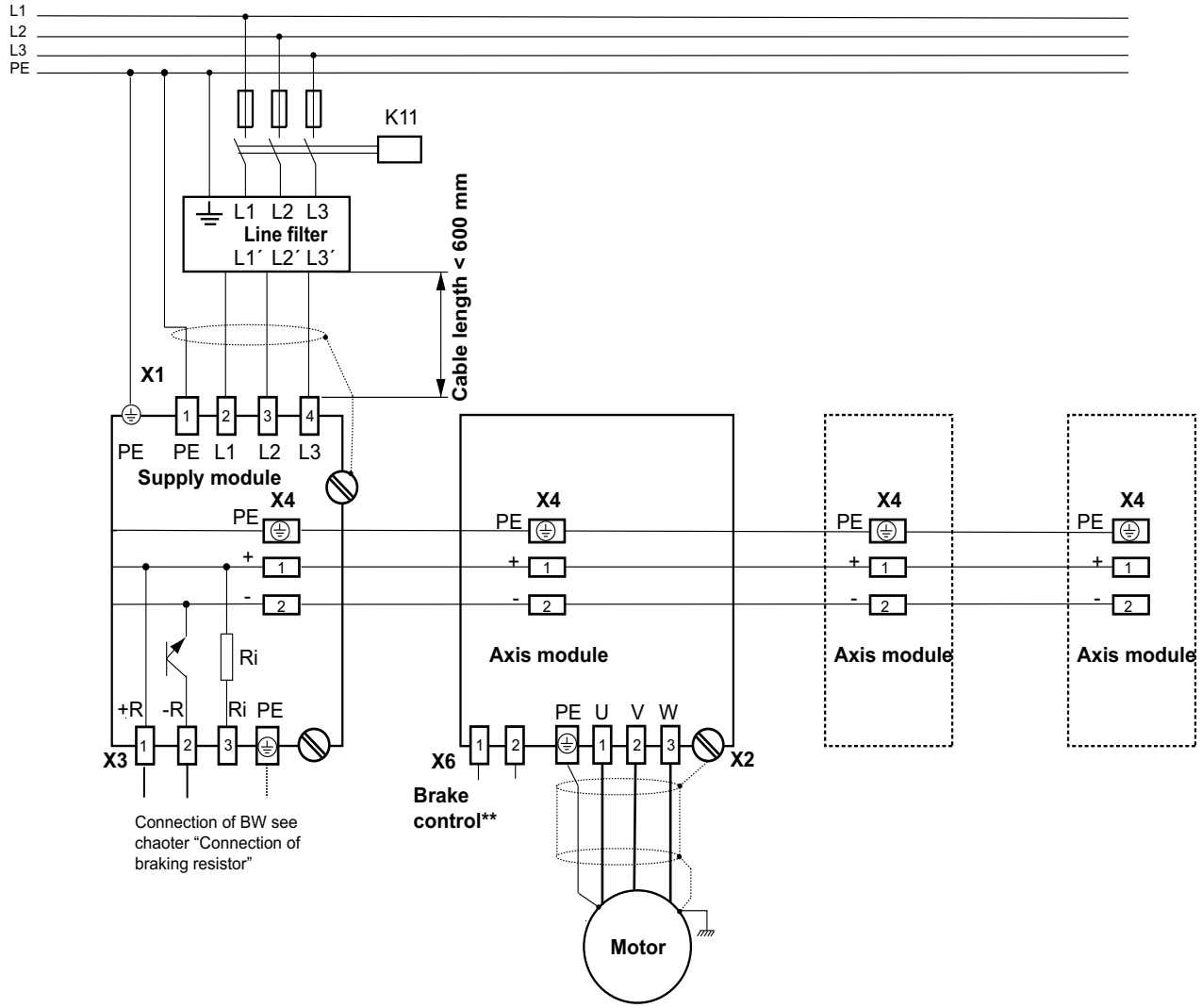
Wiring the MXP81.. power connections with integrated braking resistor



1500842507

** Make sure to provide separate isolation for the brake lines when controlling the brakes with 24 V. We recommend using SEW hybrid cables that offer complete shielding with shielding supports as well as separate shielding for the brake line.

Wiring the MXP81.. power connections with external braking resistor

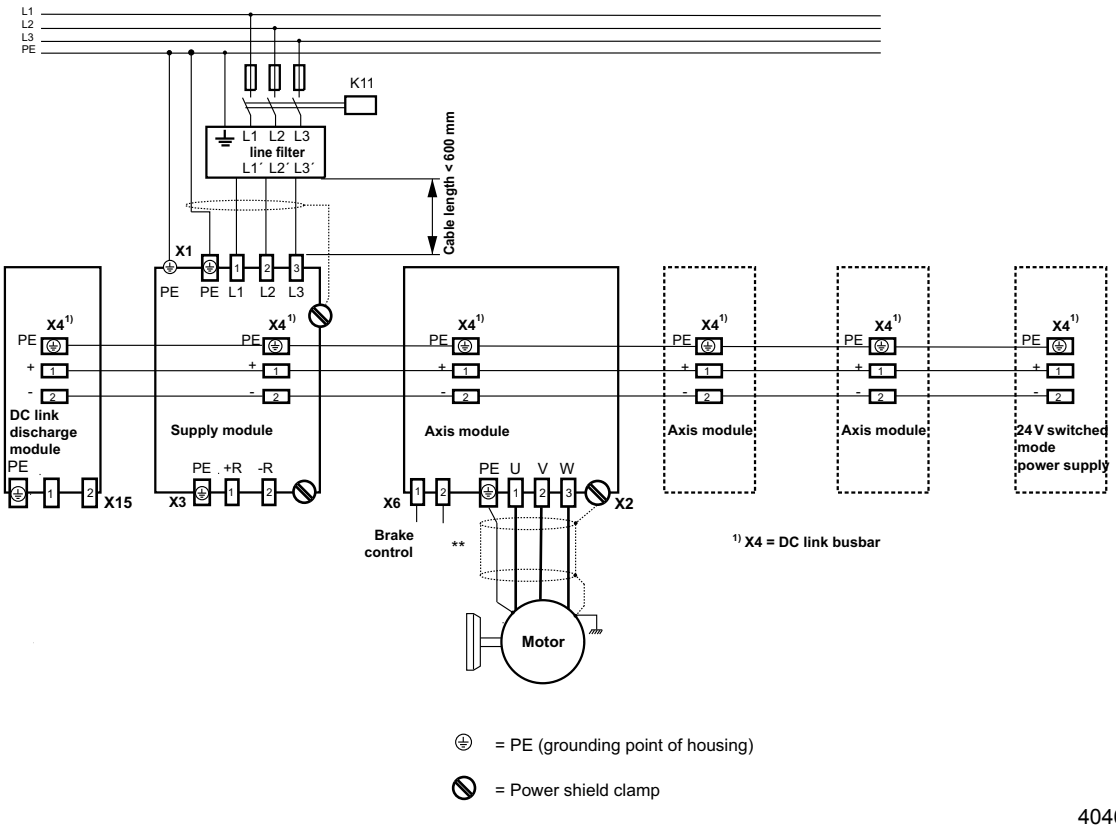


1502085899

** Make sure to provide separate isolation for the brake lines when controlling the brakes with 24 V. We recommend using SEW hybrid cables that offer complete shielding with shielding supports as well as separate shielding for the brake line.

4.12.3 Connecting supply module, axis modules and DC link discharge module

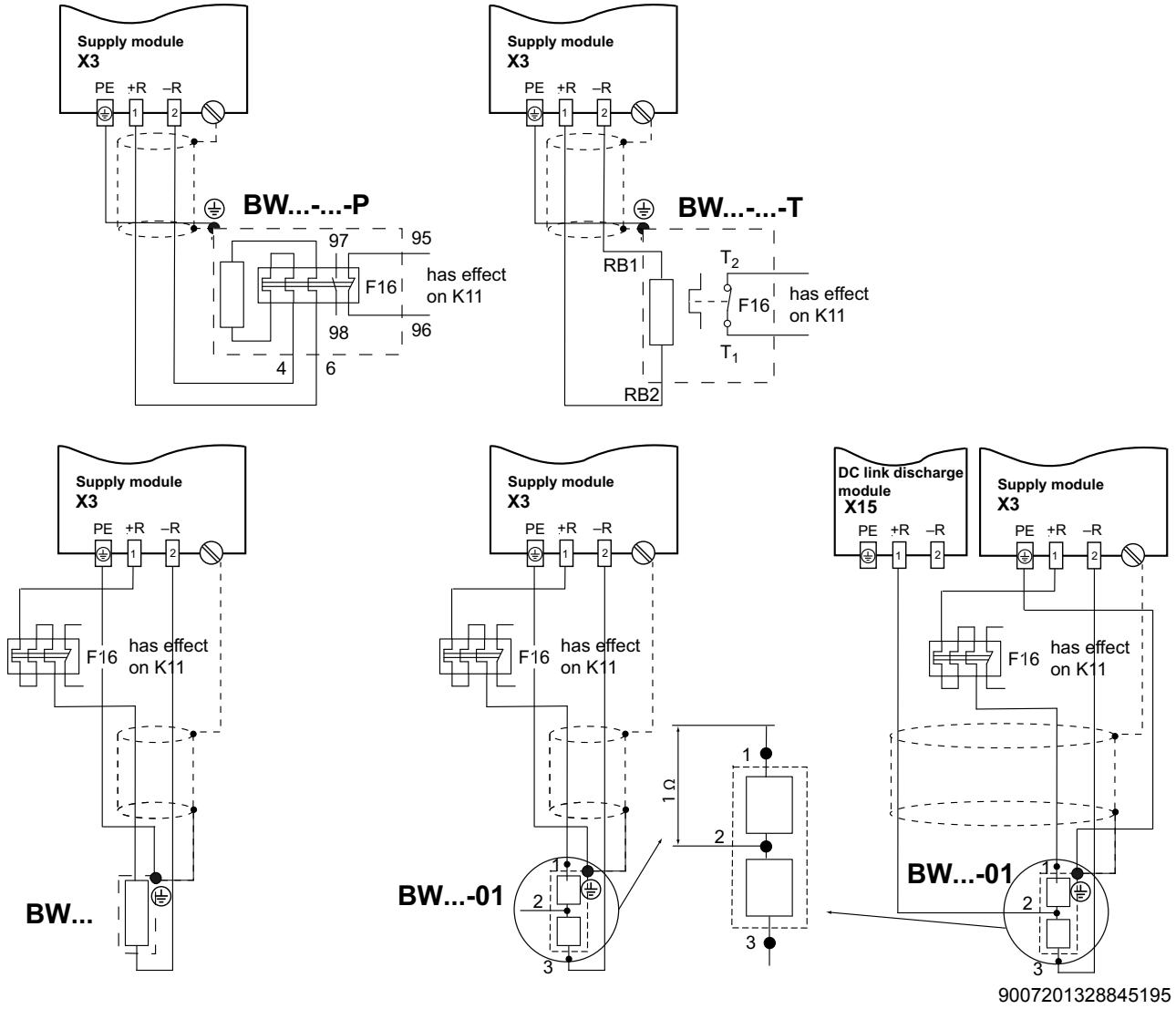
Wiring of power terminals



4046957579

****** Make sure to provide separate isolation for the brake lines when controlling the brakes with 24 V. We recommend using SEW hybrid cables that offer complete shielding with shielding supports as well as separate shielding for the brake line.

4.12.4 Connecting braking resistors

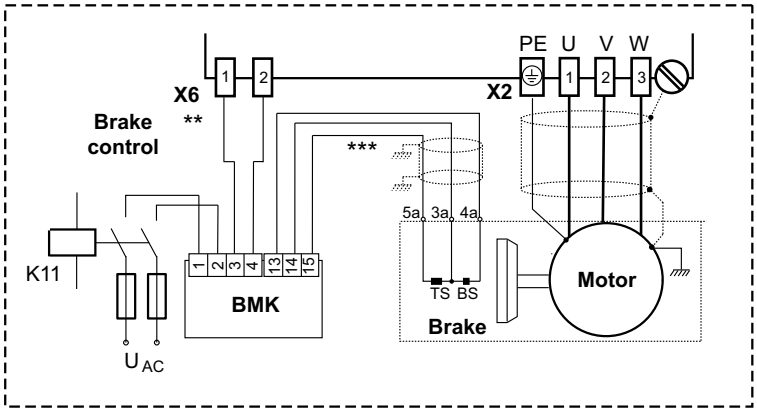


BW...-...-P	BW...-...-T	BW... , BW...-01
When the signal contact F16 trips, K11 must open. When F16 (trip contact at overload relay or temperature switch) triggers, K11 must open and "Output stage enable" must receive a "0" signal. F16 is a signal contact, which means the resistor circuit must not be interrupted.	When the internal temperature switch trips, K11 must open. When F16 (trip contact at overload relay or temperature switch) triggers, K11 must open and "Output stage enable" must receive a "0" signal. F16 is a signal contact, which means the resistor circuit must not be interrupted.	When the external bimetallic relay (F16) trips, K11 must open. When F16 (trip contact at overload relay or temperature switch) triggers, K11 must open and "Output stage enable" must receive a "0" signal. F16 is a signal contact, which means the resistor circuit must not be interrupted.

Braking resistor type	Overload protection
BW..	External bimetallic relay F16
BW...-01	External bimetallic relay F16
BW..-..-T	• Internal temperature switch or • External bimetallic relay F16
BW..-..-P	Internal bimetallic relay F16

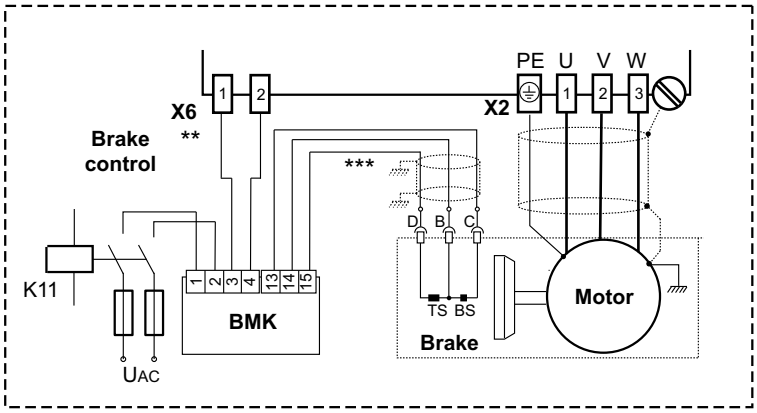
4.12.5 Brake control

BMK brake control with terminal box



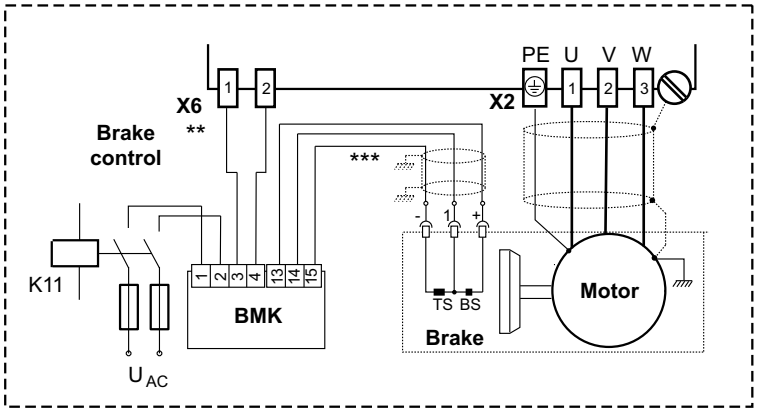
2788968971

BMK brake control with SB1 plug connector



2788973579

BMK brake control with SBB plug connector

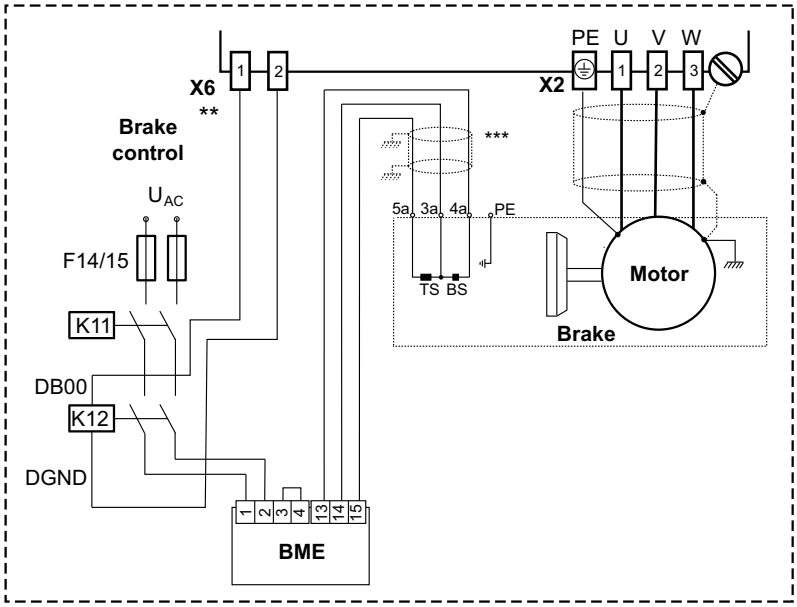


2788971403

** Make sure to provide separate isolation for the brake lines when controlling the brakes with 24 V. We recommend using SEW hybrid cables that offer complete shielding with shielding supports as well as separate shielding for the brake line.

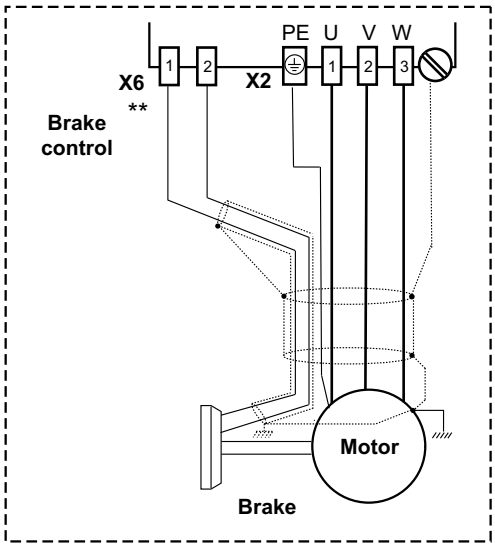
*** Install the connection cables between the brake rectifier and the brake separately from other power cables when installing the brake rectifier in the control cabinet. Joint installation is only permitted with shielded power cables.

BME brake control with terminal box



2788977419

Directly controlled motor brake

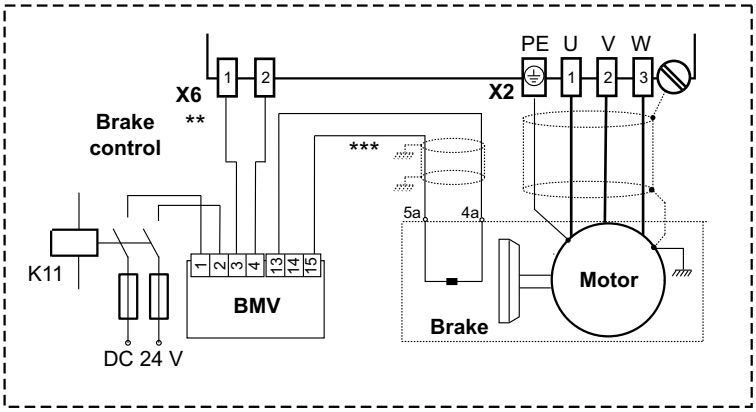


2789159179

** Make sure to provide separate isolation for the brake lines when controlling the brakes with 24 V. We recommend using SEW hybrid cables that offer complete shielding with shielding supports as well as separate shielding for the brake line.

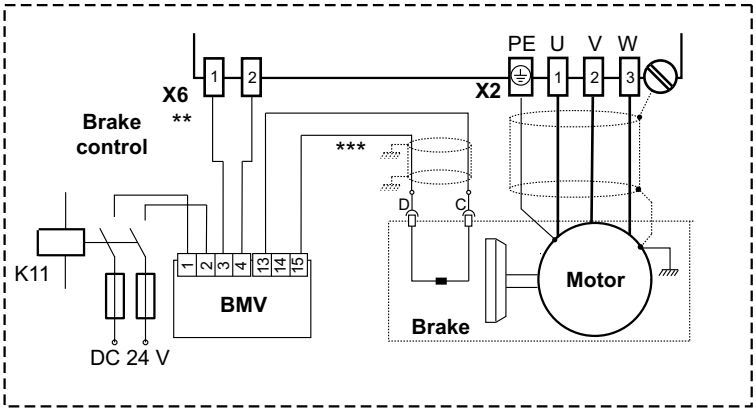
*** Install the connection cables between the brake rectifier and the brake separately from other power cables when installing the brake rectifier in the control cabinet. Joint installation is only permitted with shielded power cables.

BP brake control BMV with terminal box



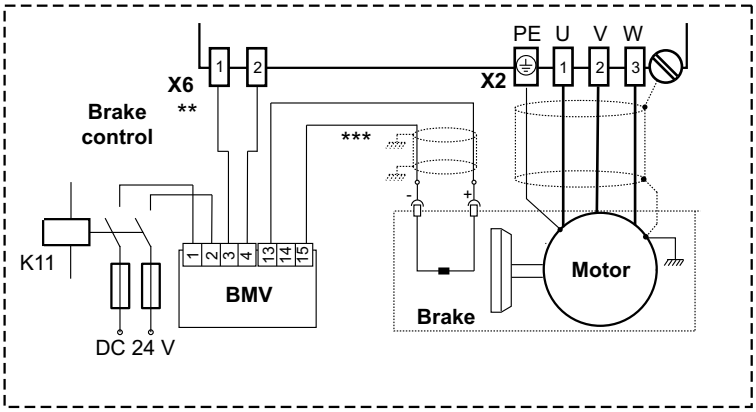
2788940427

BP brake control BMV with SB1 plug connector



2788942859

BP brake control BMV with SBB plug connector

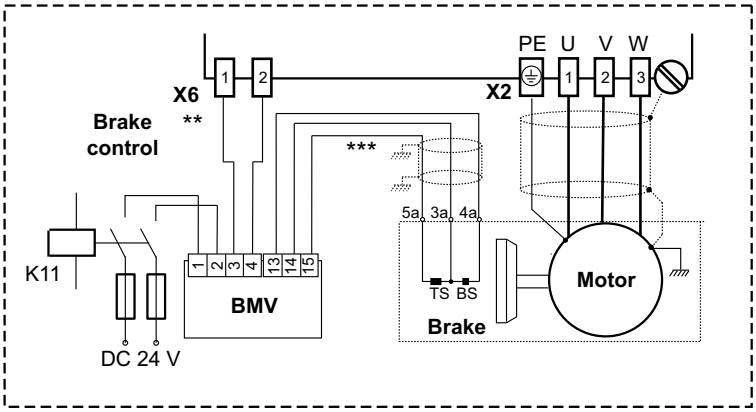


2788945291

****** Make sure to provide separate isolation for the brake lines when controlling the brakes with 24 V. We recommend using SEW hybrid cables that offer complete shielding with shielding supports as well as separate shielding for the brake line.

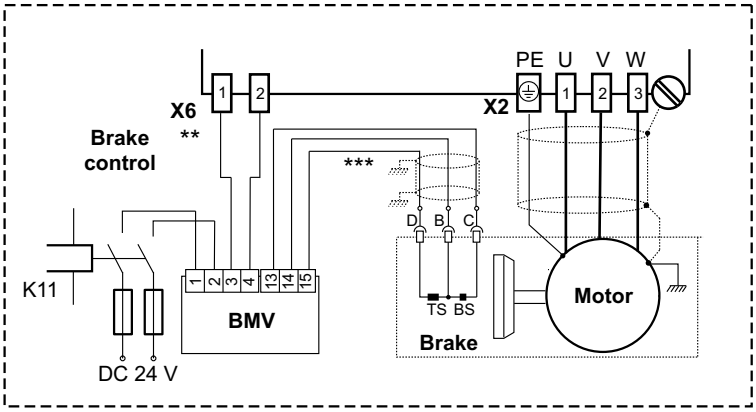
******* Install the connection cables between the brake rectifier and the brake separately from other power cables when installing the brake rectifier in the control cabinet. Joint installation is only permitted with shielded power cables.

BY brake control BMV with terminal box



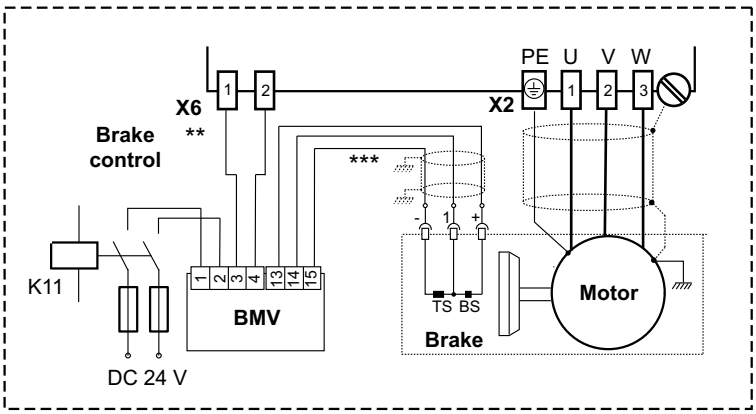
2788948875

BY brake control BMV with SB1 plug connector



2788966539

BY brake control BMV with SBB plug connector



2788951307

** Make sure to provide separate isolation for the brake lines when controlling the brakes with 24 V. We recommend using SEW hybrid cables that offer complete shielding with shielding supports as well as separate shielding for the brake line.

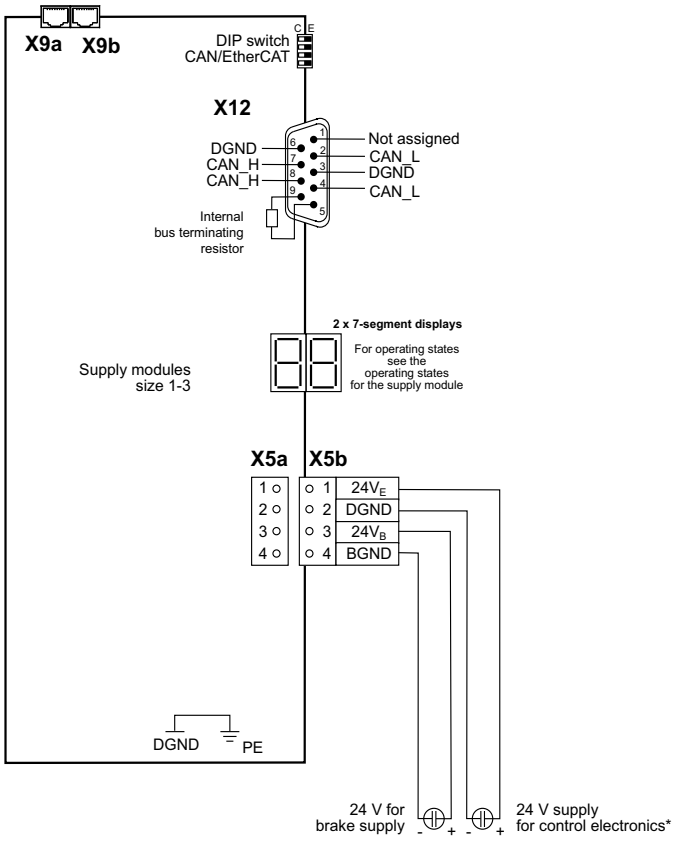
*** Install the connection cables between the brake rectifier and the brake separately from other power cables when installing the brake rectifier in the control cabinet. Joint installation is only permitted with shielded power cables.

BST brake control

For information about BST brake control, refer to the "BST Safety-Related Brake Module" operating instructions.

4.12.6 Connection of supply module and supply and regenerative module

Wiring the control electronics



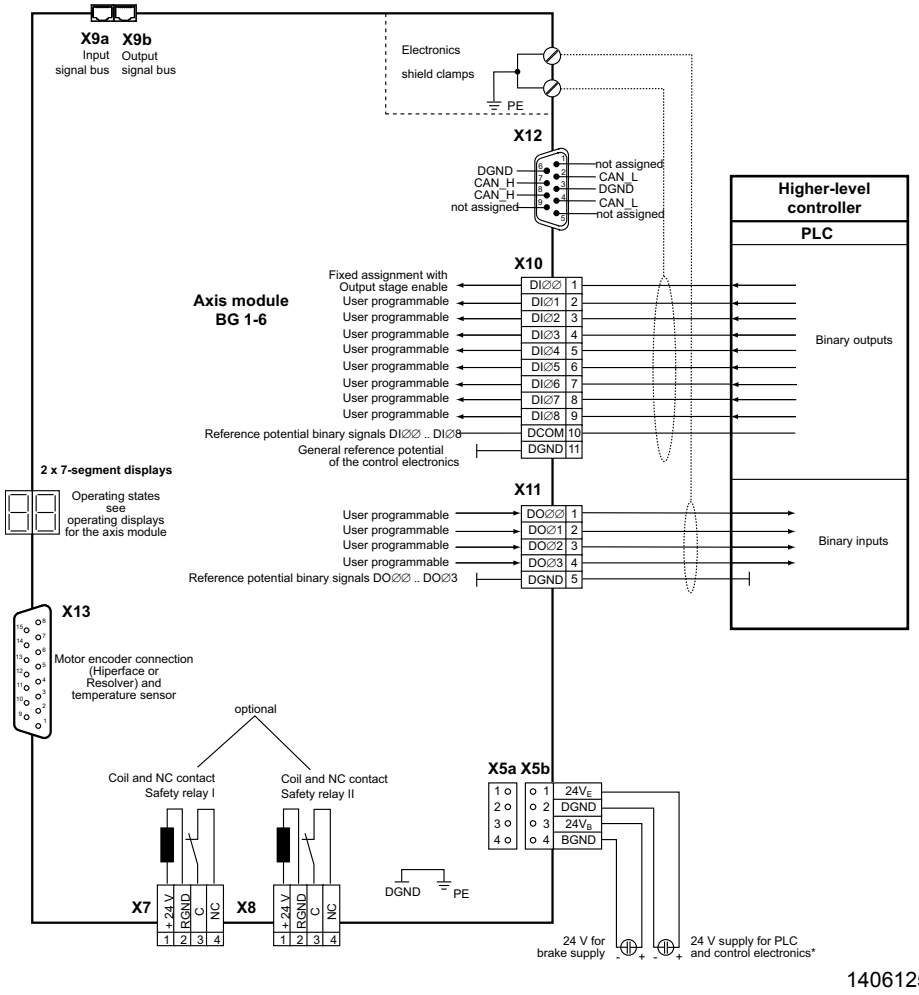
1406123531

* Connection via supplied pre-fabricated cables.

X9a System bus input
X9b System bus output

4.12.7 Connection of axis modules

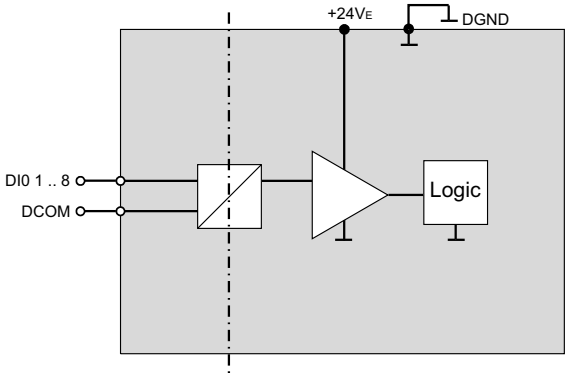
Wiring the control electronics



1406125963

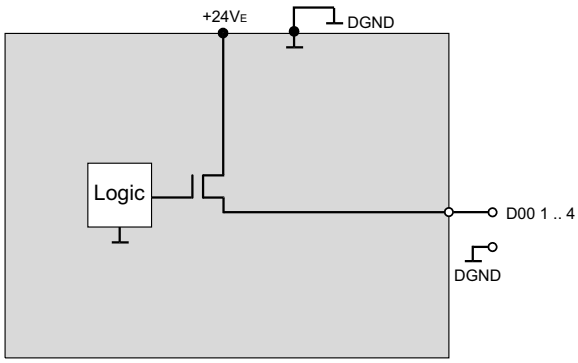
* Connection via supplied pre-fabricated cables.

Connection diagram of binary inputs



1406128395

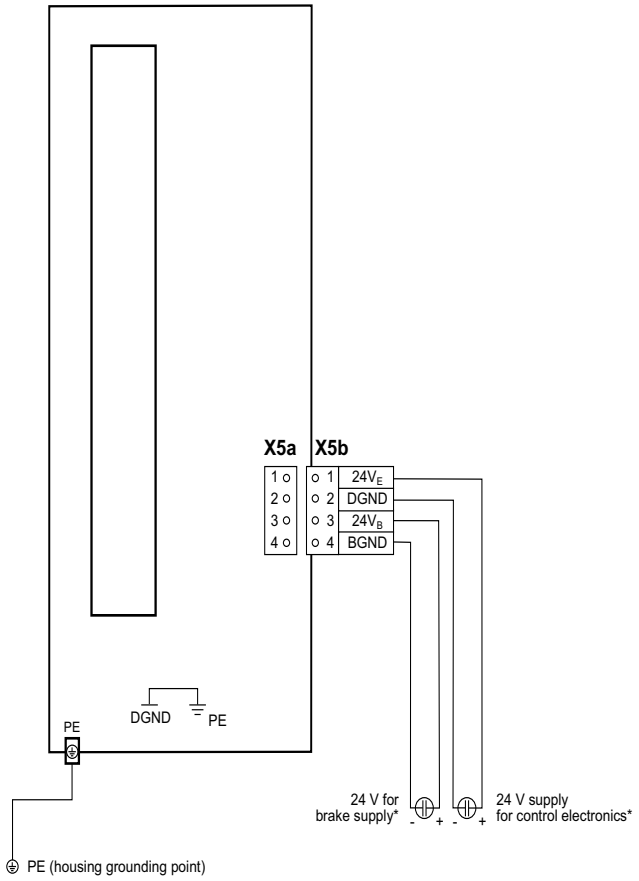
Connection diagram of binary outputs



1406130827

4.12.8 Connection of master module component

Wiring the control electronics



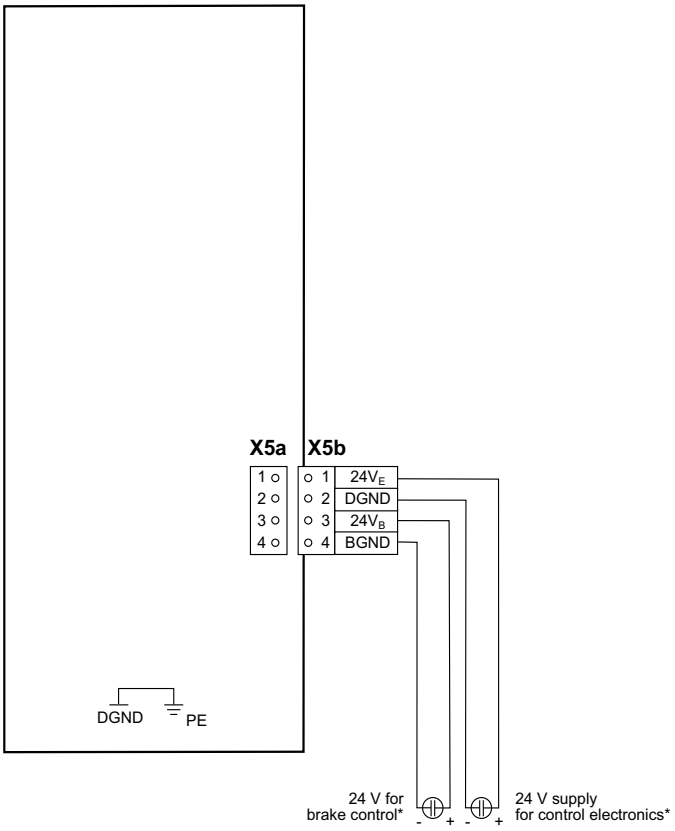
1406133259

* Connection via supplied pre-fabricated cables.

	CAUTION
	The housing grounding point of the master module must be connected to PE, e.g. at the control cabinet.

4.12.9 Connection of capacitor module component

Wiring the control electronics

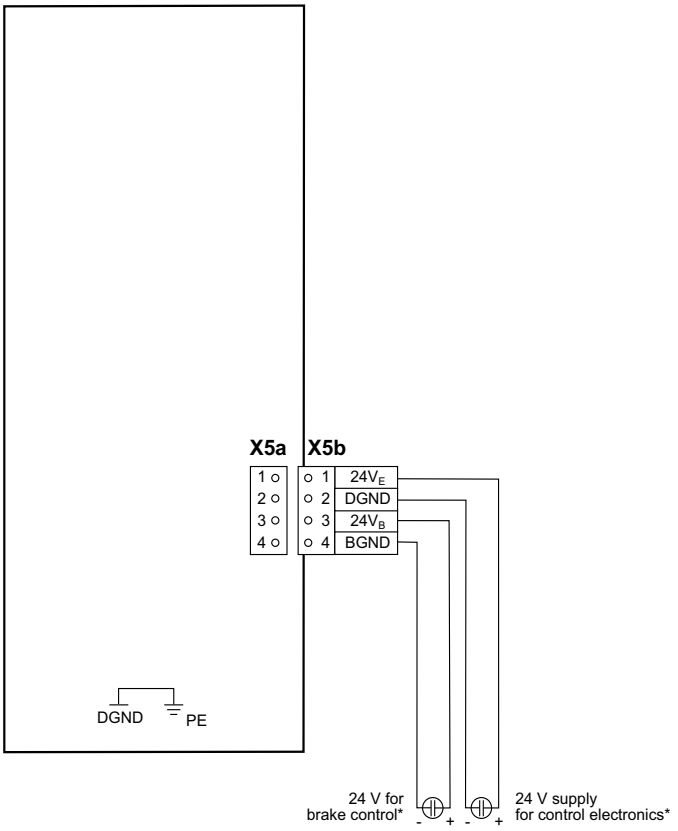


1406212491

* Connection via supplied pre-fabricated cables.

4.12.10 Connection of buffer module component

Wiring the control electronics

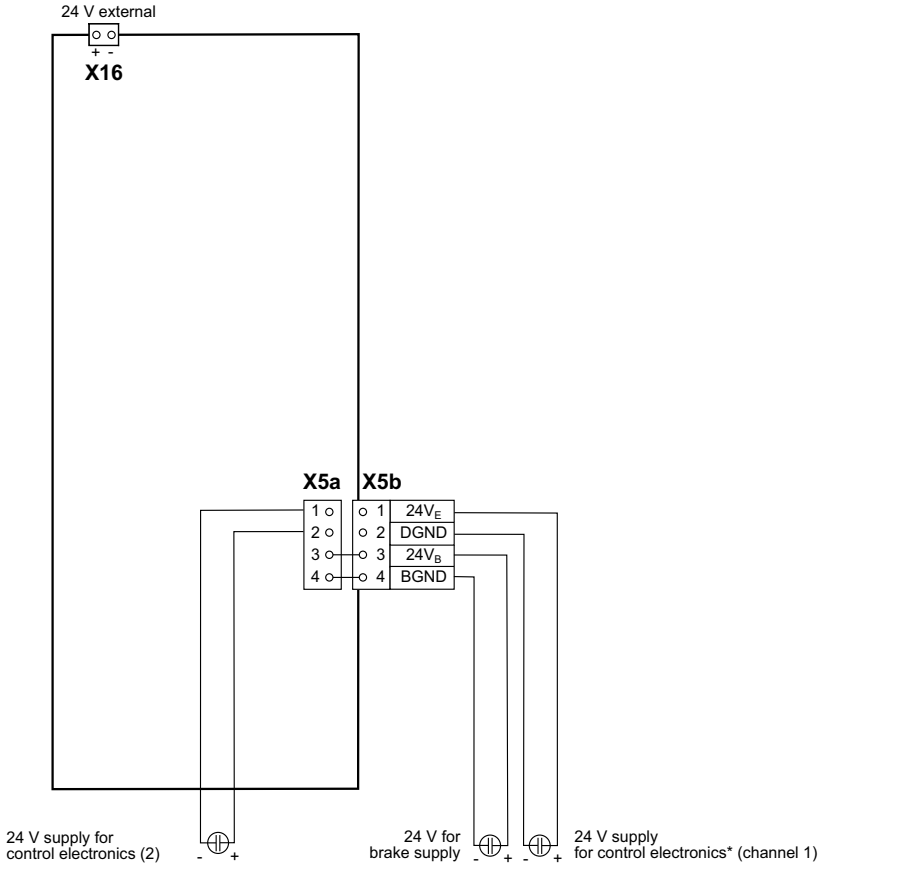


1406212491

* Connection via supplied pre-fabricated cables.

4.12.11 Connection of 24 V switched-mode power supply module component

Wiring the control electronics

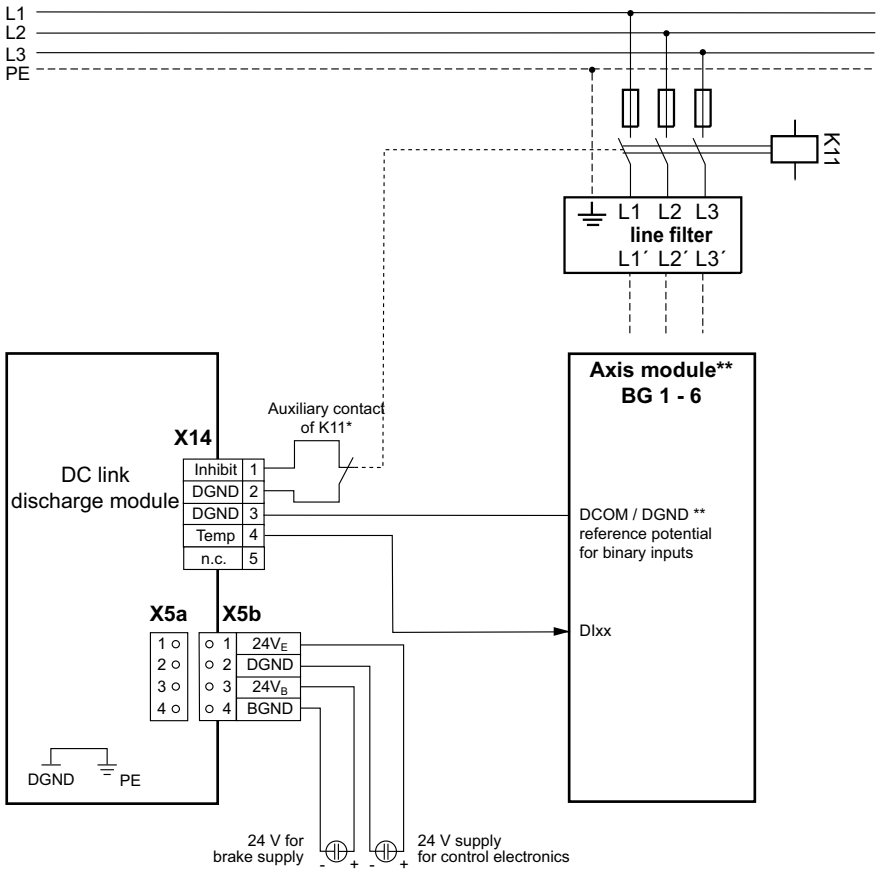


* Connection via supplied pre-fabricated cables.

You find more information on 24 V supply and control electronics in the "MOVIAXIS® Multi-Axis Servo Inverter" system manual.

4.12.12 Connecting the DC link discharge module additional component

Wiring the control electronics



4046960011

* Contact must be suitable for switching very small currents (≤ 50 mA).

** See chapter "Connecting axis modules" (page 80)

	NOTICE
	Possible damage of the supply module and braking resistor. When operating the DC link discharge module, make sure to activate discharge of the DC link only if the following requirements are met: • The main contacts of the K11 relay are open • Output stage enable of all axis modules is withdrawn

	INFORMATION
	Use a contactor with lagging auxiliary contact to prevent that supply module and braking resistor are damaged.

4.13 Terminal assignment

INFORMATION

Reference potentials inside the unit:

The designation of the reference potentials is listed in the following table:

Designation	Meaning
DGND PE	General reference potential of control electronics. There is a metallic connection to PE.
BGND	Reference potential for brake connection
RGND	Reference potential for safety relay
DCOM	Reference potential for binary inputs

INFORMATION

Connection elements:

All connection elements are represented in the following tables as viewed from top.

4.13.1 Terminal assignment of MXP80.. supply modules

INFORMATION

The technical data for the connection of power electronics and control electronics are listed in chapter "Technical Data".

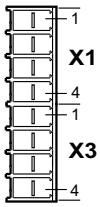
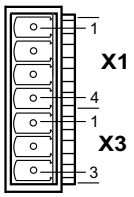
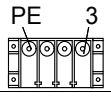
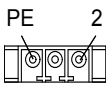
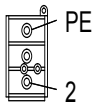
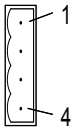
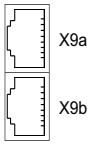
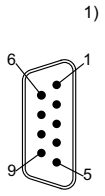
	Terminal	Assignment	Brief description
	**X1:1** **X1:2** **X1:3** **X1:4**	**PE** **L1** **L2** **L3**	Power supply connection (BG1 / 10 kW))
	X3:1 **X3:2** **X3:3** **X3:4**	**+R** **-R** **n.c.** **PE**	Braking resistor connection (BG1 / 10 kW))
	**X1:1** **X1:2** **X1:3** **X1:4**	**PE** **L1** **L2** **L3**	Supply system connection (size 2 / 25 kW)
	X3:1 **X3:2** **X3:3**	**+R** **-R** **PE**	Braking resistor connection (size 2 / 25 kW)

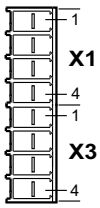
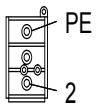
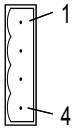
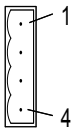
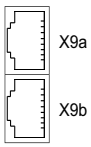
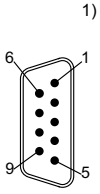
Table continued on next page

	Terminal	Assignment	Brief description
	**X1:PE** **X1:1** **X1:2** **X1:3**	**PE** **L1** **L2** **L3**	Supply system connection (size 3 / 50, 75 kW)
	**X3:PE** **X3:1** **X3:2**	**PE** **+R** **-R**	Braking resistor connection (size 3 / 50, 75 kW)
	**X4:PE** **X4:1** **X4:2**	**PE** **+U_Z** **- U_Z**	DC link bus connection
	X5a:1 **X5a:2**	**+24 V_E** **DGND**	Voltage supply for electronics
	X5a:3 **X5a:4**	**+24 V_B** **BGND**	Voltage supply for brake supply
	**X5b:1** **X5b:2**	**+24 V_E** **DGND**	Voltage supply for electronics
	X5b:3 **X5b:4**	**+24 V_B** **BGND**	Voltage supply for brake supply
	**X9a** **X9b**		a = Input: System bus, with green plug b = Output: System bus, with red plug
	**X12:1** **X12:2** **X12:3** **X12:4** **X12:5** **X12:6** **X12:7** **X12:8** **X12:9**	**n.c.** **CAN_L** **DGND** **CAN_L** **$R_{termination}$** **DGND** **CAN_H** **CAN_H** **$R_{termination}$**	CAN bus low Reference potential CAN bus CAN bus low Unit internal SBus terminating resistor Reference potential CAN bus CAN bus high CAN bus high Unit internal SBus terminating resistor

1) Only for CAN-based system bus. No function for EtherCAT®-compatible system bus.

4.13.2 Terminal assignment of MXP81.. supply modules

	INFORMATION
	The technical data for the connection of power electronics and control electronics are listed in chapter "Technical Data".

	Terminal	Assignment	Brief description
	**X1:1** **X1:2** **X1:3** **X1:4**	**PE** **L1** **L2** **L3**	Power supply connection (BG1 / 10 kW))
	X3:1 **X3:2** **X3:3** **X3:4**	**+R** **-R** **Ri** **PE**	Braking resistor connection (BG1 / 10 kW))
	**X4:PE** **X4:1** **X4:2**	**PE** **+U_Z** **- U_Z**	DC link bus connection
	**X5a:1** **X5a:2**	**+24 V_E** **DGND**	Voltage supply for electronics
	X5a:3 **X5a:4**	**+24 V_B** **BGND**	Voltage supply for brake supply
	**X5b:1** **X5b:2**	**+24 V_E** **DGND**	Voltage supply for electronics
	X5b:3 **X5b:4**	**+24 V_B** **BGND**	Voltage supply for brake supply
	**X9a** **X9b**		a = Input: System bus, with green plug b = Output: System bus, with red plug
	**X12:1** **X12:2** **X12:3** **X12:4** **X12:5** **X12:6** **X12:7** **X12:8** **X12:9**	**n.c.** **CAN_L** **DGND** **CAN_L** **$R_{termination}$** **DGND** **CAN_H** **CAN_H** **$R_{termination}$**	 CAN bus low Reference potential CAN bus CAN bus low Unit internal SBus terminating resistor Reference potential CAN bus CAN bus high CAN bus high Unit internal SBus terminating resistor

1) Only for CAN-based system bus. No function for EtherCAT®-based system bus.

4.13.3 Terminal assignment of the MXA axis modules

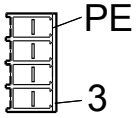
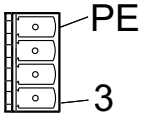
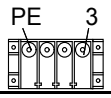
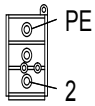
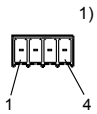
	Terminal	Assignment	Brief description
	**X2:PE** **X2:1** **X2:2** **X2:3**	**PE** **U** **V** **W**	Motor connection sizes 1, 2
	**X2:PE** **X2:1** **X2:2** **X2:3**	**PE** **U** **V** **W**	Motor connection size 3
	**X2:PE** **X2:1** **X2:2** **X2:3**	**PE** **U** **V** **W**	Motor connection sizes 4, 5, 6
	**X4:PE** **X4:1** **X4:2**	**PE** **+U_Z** **- U_Z**	DC link bus connection
	X5a:1 **X5a:2**	**+24 V_E** **DGND**	Voltage supply for electronics
	X5a:3 **X5a:4**	**+24 V_B** **BGND**	Voltage supply for brake supply
	X5b:1 **X5b:2**	**+24 V_E** **DGND**	Voltage supply for electronics
	X5b:3 **X5b:4**	**+24 V_B** **BGND**	Voltage supply for brake supply
	X6:1 **X6:2**	**DBØØ** **BGND**	Brake connection (switched)
			**Unit design with one safety relay, optional**
	X7:1 X7:2 X7:3 X7:4	+24 V RGND C NC	Safety relay I (sizes 1 – 6) Safety relay I (sizes 1 – 6), common contact Safety relay I (sizes 1 – 6), NC contact The connector comes equipped with a coding nose.
			Design with two safety relays, optional
	X8:1 X8:2 X8:3 X8:4	+24 V RGND C NC	Safety relay II (sizes 2 – 6) Safety relay II (sizes 2 – 6), common contact Safety relay II (sizes 2 – 6), NC contact The connector comes equipped with a coding nose.

Table continued on next page. Footnotes at the end of the table.

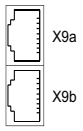
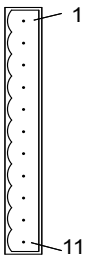
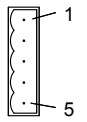
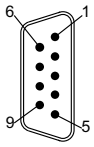
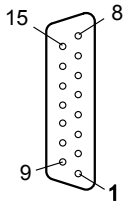
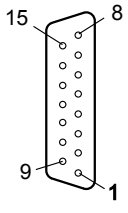
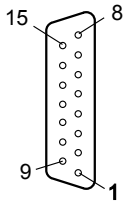
	Terminal	Assignment	Brief description	
	**X9a** **X9b**		a = Input: System bus, with green plug b = Output: System bus, with red plug	
	**X10:1** **X10:2** **X10:3** **X10:4** **X10:5** **X10:6** **X10:7** **X10:8** **X10:9** **X10:10** **X10:11**	**DIØØ** **DIØ1** **DIØ2** **DIØ3** **DIØ4** **DIØ5** **DIØ6** **DIØ7** **DIØ8** **DCOM** **DGND**	Binary input 1, with fixed assignment "Controller enable" Binary input 2, freely programmable Binary input 3, freely programmable Binary input 4, freely programmable Binary input 5, freely programmable Binary input 6, freely programmable Binary input 7, freely programmable Binary input 8, freely programmable Binary input 9, freely programmable Reference potential for the binary inputs DIØØ – DIØ8 General reference potential of control electronics	Electrically isolated via optocoupler with reference to DCOM (X10:10).
	**X11:1** **X11:2** **X11:3** **X11:4** **X11:5**	**DOØØ** **DOØ1** **DOØ2** **DOØ3** **DGND**	Binary output 1, freely programmable Binary output 2, freely programmable Binary output 3, freely programmable Binary output 4, freely programmable Reference potential for the binary outputs DOØØ – DOØ3	
	**X12:1** **X12:2** **X12:3** **X12:4** **X12:5** **X12:6** **X12:7** **X12:8** **X12:9**	**n.c.** **CAN_L** **DGND** **CAN_L** **$R_{termination}$** **DGND** **CAN_H** **CAN_H** **$R_{termination}$**	CAN2 Bus Low Reference potential CAN bus CAN2 Bus Low Unit internal SBus terminating resistor Reference potential CAN bus CAN2 Bus High CAN2 Bus High Unit internal SBus terminating resistor	
	**X13:1** **X13:2** **X13:3** **X13:4** **X13:5** **X13:6** **X13:7** **X13:8** **X13:9** **X13:10** **X13:11** **X13:12** **X13:13** **X13:14** **X13:15**	**S2 (SIN +)** **S1 (COS +)** **n.c.[2)]** **n.c.** **R1 (REF +)** **TF/TH/KTY-** **n.c.** **n.c.** **S4 (SIN -)** **S3 (COS -)** **n.c.** **n.c.** **R2 (REF -)** **TF/TH/KTY+** **n.c.**	Motor resolver connection	

Table continued on next page. Footnotes at the end of the table.

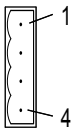
	Terminal	Assignment	Brief description
	**X13:1** **X13:2** **X13:3** **X13:4** **X13:5** **X13:6** **X13:7** **X13:8** **X13:9** **X13:10** **X13:11** **X13:12** **X13:13** **X13:14** **X13:15**	**Signal track A (cos +)** **Signal track B (sin +)** **Signal track C** **n.c.** **n.c.** **TF/TH/KTY-** **n.c.** **DGND** **Signal track A_N (cos -)** **Signal track B_N (sin -)** **Signal track C_N** **n.c.** **n.c.** **TF/TH/KTY+** **U_S** [3]	Connection of motor encoders: sin/cos encoder, TTL encoder
	**X13:1** **X13:2** **X13:3** **X13:4** **X13:5** **X13:6** **X13:7** **X13:8** **X13:9** **X13:10** **X13:11** **X13:12** **X13:13** **X13:14** **X13:15**	**Signal track A (cos +)** **Signal track B (sin +)** **n.c.** **DATA+** **n.c.** **TF/TH/KTY-** **n.c.** **DGND** **Signal track A_N (cos -)** **Signal track B_N (sin -)** **n.c.** **DATA-** **n.c.** **TF/TH/KTY+** **U_S** [3]	Connection of Hiperface® motor encoder

1) The pin assignment is identical for both connectors (X7 and X8) and they are interchangeable. Coding prevents an incorrect connection.

2) Do not connect any cable.

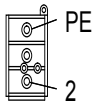
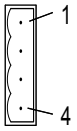
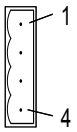
3) 12 V, max. 500 mA

4.13.4 Terminal assignment of the MXM master module

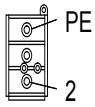
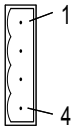
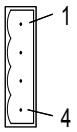
	Terminal	Assignment	Brief description
	**X5a:1** **X5a:2**	**+24 V_E** **DGND**	Voltage supply for electronics [1]
	X5a:3 **X5a:4**	**+24 V_B** **BGND**	Voltage supply for brake supply
	X5b:1 **X5b:2**	**+24 V_E** **DGND**	Voltage supply for electronics
	X5b:3 **X5b:4**	**+24 V_B** **BGND**	Voltage supply for brake supply

1) Only for looping through

4.13.5 Terminal assignment of the MXC capacitor module

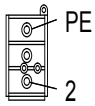
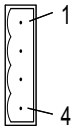
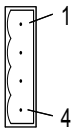
	Terminal	Assignment	Brief description
	**X4:PE** **X4:1** **X4:2**	**PE** **+U_Z** **- U_Z**	DC link bus connection
	**X5a:1** **X5a:2**	**+24 V_E** **DGND**	Voltage supply for electronics
	X5a:3 **X5a:4**	**+24 V_B** **BGND**	Voltage supply for brake supply
	**X5b:1** **X5b:2**	**+24 V_E** **DGND**	Voltage supply for electronics
	X5b:3 **X5b:4**	**+24 V_B** **BGND**	Voltage supply for brake supply

4.13.6 Terminal assignment of the MXB buffer module

	Terminal	Assignment	Brief description
	**X4:PE** **X4:1** **X4:2**	**PE** **+U_Z** **- U_Z**	DC link bus connection
	**X5a:1** **X5a:2**	**+24 V_E** **DGND**	Voltage supply for electronics
	X5a:3 **X5a:4**	**+24 V_B** **BGND**	Voltage supply for brake supply[1)]
	**X5b:1** **X5b:2**	**+24 V_E** **DGND**	Voltage supply for electronics
	X5b:3 **X5b:4**	**+24 V_B** **BGND**	Voltage supply for brake supply

1) Only for looping through

4.13.7 Terminal assignment of the MXS 24 V switched-mode power supply module

	Terminal	Assignment	Brief description
	**X4:PE** **X4:1** **X4:2**	**PE** **n.c.** **- U_Z**	DC link bus connection
	**X5a:1** **X5a:2**	**+24 V_E** **DGND**	Voltage supply for electronics (channel 1)[1]
	X5a:3 **X5a:4**	**+24 V_B** **BGND**	Voltage supply for brake (channel 3)[1]
	**X5b:1** **X5b:2**	**+24 V_E** **DGND**	Voltage supply for electronics (channel 2)[1]
	X5b:3 **X5b:4**	**+24 V_B** **BGND**	Voltage supply for brake (channel 3)[1]
	X16:1 **X16:2**	**+24 V** **DGND**	External 24 V voltage supply (input) Is intended to supply the backup voltage to ensure that the control voltage is maintained when switching off the power supply.

[1] The MXS switched-mode power supply provides a voltage supply of 3 × 24 V (channels 1 – 3). X5a and X5b are jumpered internally and represent one channel. The maximum current across all the three channels is 25 A (600 W). The uniform reference potential of all channels is the unit's earth.

4.13.8 Terminal assignment of the DC link discharge module MXZ

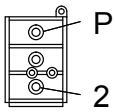
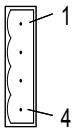
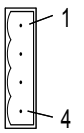
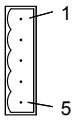
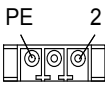
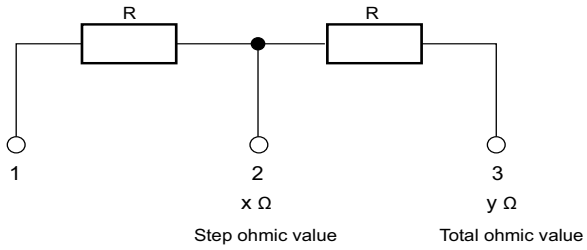
	Terminal	Assignment	Brief description
	**X4:PE** **X4:1** **X4:2**	**PE** **n.c.** **- U_Z**	DC link bus connection
	**X5a:1** **X5a:2**	**+24 V_E** **DGND**	Voltage supply for electronics
	X5a:3 **X5a:4**	**+24 V_B** **BGND**	Voltage supply for brake supply
	**X5b:1** **X5b:2**	**+24 V_E** **DGND**	Voltage supply for electronics
	X5b:3 **X5b:4**	**+24 V_B** **BGND**	Voltage supply for brake supply

Table continued on next page.

	Terminal	Assignment	Brief description
	**X14:1** **X14:2** **X14:3** **X14:4** **X14:5**	**Inhibit** **DGND** **DGND** **TEMP** **n.c.**	Control signal for discharge process → discharge process is started once the connection "Inhibit" with GND has been established. Connect the Inhibit input in a non-separable manner (fixed installation) with the break contact of the mains contactor. Reference potential for the TEMP binary output Binary output (= High, 24 V) when the temperature of the MXZ.. power switch is in the permitted range.
	**X15:PE** **X15:1** **X15:2**	**PE** **Discharge** **n.c.**	Connection braking resistor for discharge

4.13.9 Terminal assignment of the braking resistors

The following figure shows a braking resistor with central tap.



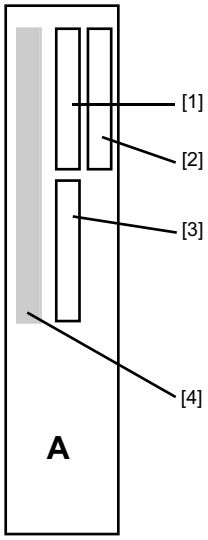
See also the wiring diagrams of the braking resistors (page 74).

Dimension drawings of braking resistors with information about the connection cable are included in the "MOVIAXIS® Multi-Axis Servo Inverter" catalog.

4.14 Connecting the option cards

4.14.1 Installation and function combinations of the option cards

MOVIAXIS® axis module can have up to three option cards installed. Depending on the option cards that you want to install, the following combinations must be considered.



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[1 - 3] Slots 1 - 3, assignment see following table
[4] Control board – component of the basic unit

A general distinction is made between whether MOVIAXIS® is used with the CAN-based system bus (SBus) or the EtherCAT®-compatible SBus^{plus}.

CAN unit variants

When using the CAN-based SBus, all three slots can be used according the following table.

The following tables show the possible combinations and the fixed assignment of cards to the slots.

Fieldbus combinations

The fieldbus options can be plugged in the following combinations:

Combination	Slot 1	Slot 2	Slot 3
1	Fieldbus option[1)]		
2	XIO11A	Fieldbus option	
3			XIA11A
4			XGH
5			XGS
6			XIO11A
7	XIA11A		
8			XGH
9			XGS
10			XIA11A
11	Fieldbus option		XGH
12	XGS	Fieldbus option	
13	XGH		
14	Fieldbus option		XGS
15	XGS	Fieldbus option	

1) **XFE24A**: EtherCAT®; **XFP11A**: PROFIBUS; **XFA11A**: K-Net

XIO combinations

The options can be combined as follows:

Combination	Slot 1	Slot 2	Slot 3
1	XIO11A		
2		XIA11A	
3			XGH
4			XGS
5		XIA11A	XGH
6			XGS
7		XGS	XGH
8		XGH	
9		XGS	XGS
10		XIO11A	
11			XGH
12			XGS

XIA combinations

The options can be combined as follows:

Combination	Slot 1	Slot 2	Slot 3
1	XIA11A		
2			XGH
3			XGS
4		XGS	XGH
5		XGH	
6		XGS	XGS
7		XIA11A	
8			XGH
9			XGS

Combinations with XGH, XGS only

The options can be combined as follows:

Combination	Slot 1	Slot 2	Slot 3
1			XGH
2	XGS		
3	XGH		

Combinations with XGS only

The options can be combined as follows:

Combination	Slot 1	Slot 2	Slot 3
1			XGS
2	XGS		

EtherCAT®-capable units

When using SBus^{plus} (EtherCAT®-compatible high-speed system bus), the XSE option must be installed in slot 1.

The following table shows the possible combinations and the fixed assignment of cards to the slots.

Combinations with EtherCAT®-compatible system bus

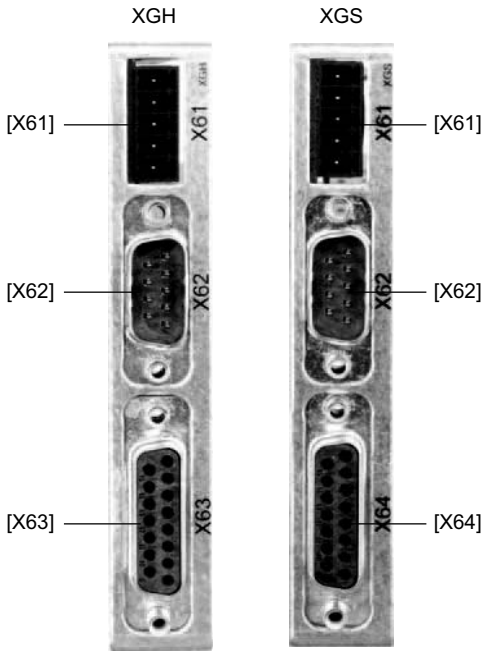
The options can be combined as follows:

Combination	Slot 1	Slot 2	Slot 3
1	XSE24A		
2		XIO11A	
3			XIA11A
4			XGH
5			XGS
6			XIO11A
7		XIA11A	
8			XGH
9			XGS
10			XIA11A
11			XGH
12		XGS	
13		XGH	
14			XGS
15		XGS	

4.14.2 XGH11A, XGS11A multi-encoder card option

The multi-encoder card expands the MOVIAXIS® system for evaluation of additional encoders.

Two different multi-encoder cards are available. Their selection is based on the encoder type that is to be evaluated, see encoder list on the next page. An analog, differential input (±10 V) is available in addition.



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Overview of functions

The following functions and encoder types can be evaluated with the multi-encoder card:

Functions	XGH version	XGS version
SSI functionality	--	x
Hiperface® functionality	x	x
EnDat 2.1 functionality		
Incremental encoder sin/cos functionality		
Incremental encoder simulation		
Temperature evaluation		
Analog, differential input ±10 V		
Optional voltage supply 24 V		
Resolver	--	--

- HTL encoders can be operated using an HTL → TTL interface adapter. You find the part number of the interface adapter in the MOVIAXIS® catalog.
- Single-ended HTL encoders can be operated using an HTL → TTL interface adapter. You find the part number of the interface adapter in the MOVIAXIS® catalog.
- **Resolvers cannot be evaluated with the multi-encoder card.**

Connection technology of the multi-encoder card

Suitable encoders You find the table of encoders supported by the multi-encoder card in the chapter "Suitable encoder systems" in the MOVIAXIS® catalog.

Restrictions for the evaluation of inputs for axis modules equipped with I/O and multi-encoder cards

	INFORMATION
	If the axis module is equipped with two I/O and one multi-encoder card or with one I/O and two multi-encoder cards (see following table), the following restrictions apply for the evaluation of inputs and outputs: **Evaluation is only possible for the inputs and outputs (if applicable) of two cards.**

Variant	Plugged card	Plugged card	Plugged card
1	I/O card	I/O card	Multi-encoder card
2	I/O card	Multi-encoder card	Multi-encoder card

Supply of the multi-encoder card The table below shows the maximally permitted currents for supplying the XGH and XGS multi-encoder cards via the MOVIAXIS® basic unit.

Number of multi-encoder cards	Maximum permitted current I_{max}
1 pc	500 mA
2 pc	800 mA[1)]

1) MOVIAXIS® cannot provide more than 800 mA in total for the supply of the multi-encoder cards

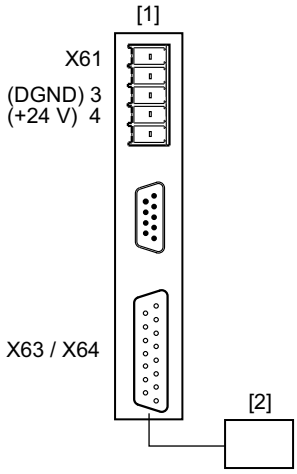
Wiring diagrams for encoder voltage supply

The following wiring diagrams show the connection of one and of two multi-encoder cards with 12 V and 24 V encoder voltage supply.

The encoder voltage supplies are specified in the appendix in the "Suitable encoder" list (page 260).

12 V without supply

Example: Wiring diagram of a multi-encoder card with 12 V and I ≤ 500 mA supply to the encoder via the basic unit:



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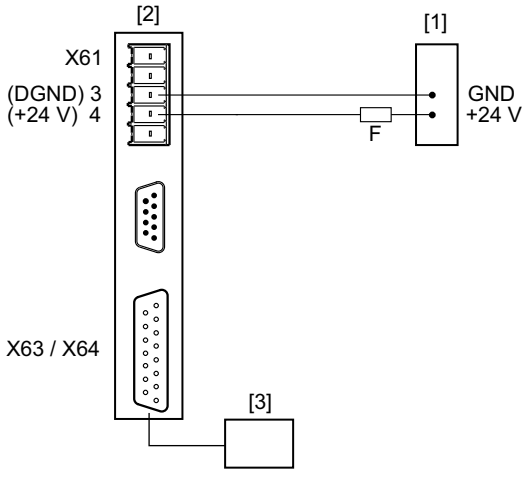
[1] Multi-encoder card
[2] encoder

24 V with external supply

Example: Wiring diagram of a multi-encoder card with 24 V encoder voltage supply and I ≤ 500 mA:



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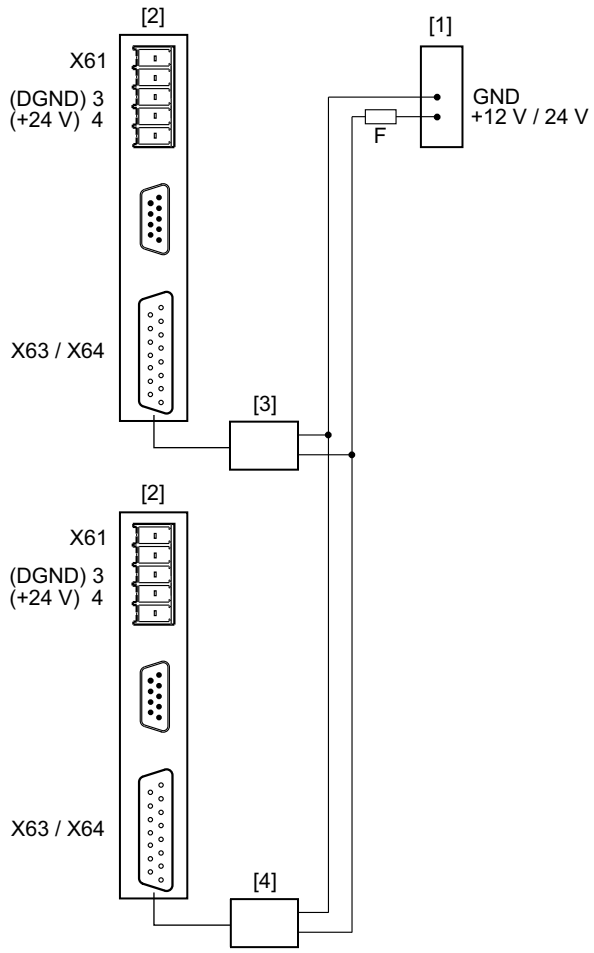
[1] Voltage source
[2] Multi-encoder card
[3] encoder

12V / 24 V, total current > 500 mA

Example: Wiring diagram of a multi-encoder card with 12 V/24 V encoder voltage supply and a total current of > 500 mA:



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[1] Voltage source
[2] Multi-encoder card
[3] Encoder 1
[4] Encoder 2

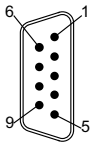
	INFORMATION
	When using two multi-encoder cards, a maximum current of 800 mA can be supplied to the encoder via the basic unit. For a total current of > 800 mA, an external voltage supply must be implemented.

Connection and terminal description of the card

Connector assignment X61

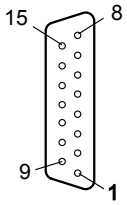
	Terminal	Assignment	Brief description	Type of connector
	X61			
	1	AI 0+	Analog, differential input	Mini Combicon 3.5, 5-pole. Cable cross section max: 0.5 mm^2
	2	AI 0-		
	3	DGND	Reference for PIN 4	
	4	24 V	Optional encoder voltage supply (24 V encoder only)	
	5	n.c.		

Connector assignment X62 encoder emulator signals

	Terminal	Assignment	Brief description	Type of connector
	**X62**			
	1	Signal track A	Encoder emulator signals	Sub-D 9-pole (male)
	2	Signal track B		
	3	Signal track C		
	4	n.c.[1)]		
	5	DGND		
	6	Signal track A_N		
	7	Signal track B_N		
	8	Signal track C_N		
	9	n.c.		

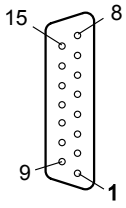
1) Do not connect any cable

PIN assignment X63 XGH X64 XGS with TTL encoder, sin/cos encoder

	Terminal	Function for TTL encoder, sin/cos encoder	Type of connector
	**X63 (XGH)**		
	1	Signal track A (cos+)	Sub-D 15-pole (female)
	2	Signal track B (sin+)	
	3	Signal track C	
	4	n.c.[1)]	
	5	n.c.	
	6	TF/TH/KTY-	
	7	n.c.	
	8	DGND	
	9	Signal track A_N (cos-)	
	10	Signal track B_N (sin-)	
	11	Signal track C_N	
	12	n.c.	
	13	n.c.	
	14	TF/TH/KTY+	
	15	Us	

1) Do not connect any cable

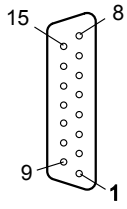
Connector assignment X63 XGH X64 XGS with Hiperface® encoder



Terminal	Function for Hiperface® encoder	Type of connector
	X63 (XGH)	
1	Signal track A (cos+)	Sub-D 15-pole (female)
2	Signal track B (sin+)	
3	n.c.[1]	
4	DATA+	
5	n.c.	
6	TF/TH/KTY-	
7	n.c.	
8	DGND	
9	Signal track A_N (cos-)	
10	Signal track B_N (sin-)	
11	n.c.	
12	DATA-	
13	n.c.	
14	TF/TH/KTY+	
15	Us	

1) Do not connect a cable

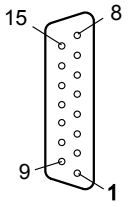
Connector assignment X63 XGH X64 XGS with EnDat 2.1



Terminal	Function for EnDat 2.1	Type of connector
	X63 (XGH)	
1	Signal track A	Sub-D 15-pole (female)
2	Signal track B	
3	Pulse +	
4	DATA+	
5	n.c.[1]	
6	TF/TH/KTY-	
7	n.c.	
8	DGND	
9	Signal track A_N	
10	Signal track B_N	
11	Cycle-	
12	DATA-	
13	n.c.	
14	TF/TH/KTY+	
15	Us	

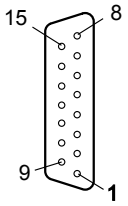
1) Do not connect any cable

Connector assignment X64 XGS with SSI

	Terminal	Function for SSI	Type of connector
	X64 (XGS)		
	1	n.c.[1]	Sub-D 15-pole (female)
	2	n.c.	
	3	Pulse +	
	4	DATA+	
	5	n.c.	
	6	TF/TH/KTY-	
	7	n.c.	
	8	DGND	
	9	n.c.	
	10	n.c.	
	11	Cycle-	
	12	DATA-	
	13	n.c.	
	14	TF/TH/KTY+	
	15	Us	

1) Do not connect a cable

Connector assignment X64 XGS with SSI (AV1Y)

	Terminal	Function for SSI (AV1Y)	Type of connector
	X64 (XGS)		
	1	Signal track A (cos+)	Sub-D 15-pole (female)
	2	Signal track B (sin+)	
	3	Pulse +	
	4	DATA+	
	5	n.c.[1]	
	6	TF/TH/KTY-	
	7	n.c.	
	8	DGND	
	9	Signal track A_N (cos-)	
	10	Signal track B_N (sin-)	
	11	Cycle-	
	12	DATA-	
	13	n.c.	
	14	TF/TH/KTY+	
	15	Us	

1) Do not connect any cable

Connection of TTL encoder to XGH, XGS

TTL encoder

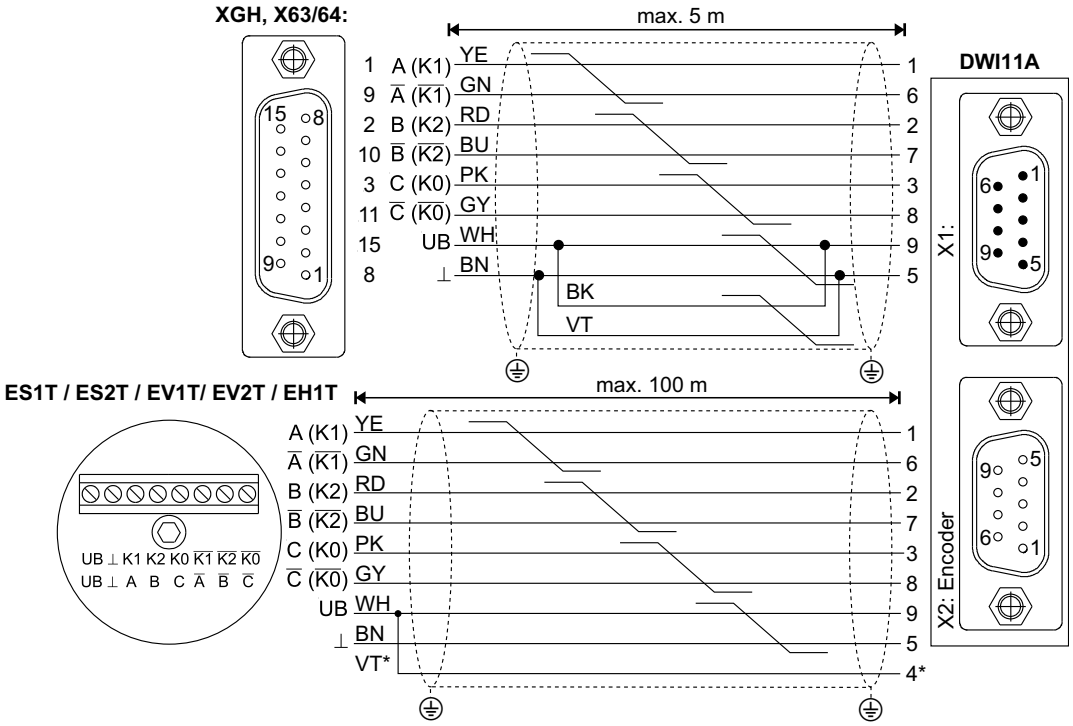
The following encoders can be connected at X63, X64 (external encoder input):

- DC 5 V TTL encoder with DC 5 V voltage supply type ES1T, ES2T, EV1T, EV2T or EH1T via DWI11A option or encoder with signal level to RS422

DC 5 V voltage supply

The TTL encoders with a DC 5 V voltage supply (ES1T, ES2T, EV1T, EV2T or EH1T) must be connected via the "DC 5 V encoder power supply type DWI11A" option (part number 822 759 4).

Connecting TTL encoders via DWI11A to XGH, XGS as a motor encoder:



* Connect the sensor cable (VT) on the incremental encoder to UB, do not jumper on the DWI11A.

DC 5 V encoder supply type DWI11A

Description

If you are using an incremental encoder with a DC 5 V encoder power supply, install the DC 5 V encoder power supply option type DWI11A between the inverter and the incremental encoder.

This option provides a regulated DC 5 V power supply for the encoder. For this purpose, the DC 12 V power supply for the encoder inputs is converted to DC 5 V by means of a voltage controller. A sensor line is used to measure the supply voltage at the encoder and compensate the voltage drop along the encoder cable.

Incremental encoders with DC 5 V encoder power supply are not allowed to be connected directly to the encoder inputs X14: and X15: . This would cause irreparable damage to the encoder.

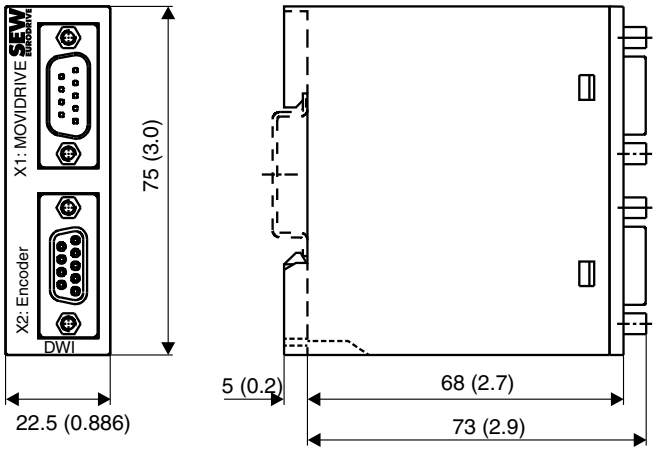
	INFORMATION
	Note that if a short circuit occurs in the sensor cable, the connected encoder may be exposed to a voltage higher than permitted.

Recommendation

Use prefabricated cables from SEW for the encoder connection.

Dimension drawing

All dimensions in mm (in)



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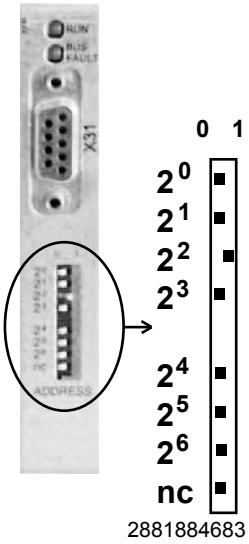
The DWI11A option is mounted on a support rail (EN 50022-35 × 7.5) in the control cabinet.

Technical data

DC 5 V encoder power supply option type DWI11A	
Part number	822 759 4
Voltage input	DC 10 – 30 V, I_{max} = DC 120 mA
Encoder power supply	DC +5 V (up to V_{max} ≈ +10 V), I_{max} = DC 300 mA
Max. line length that can be connected	100 m (328 ft) total Use a shielded twisted-pair cable (A and $\overline{A}$, B and $\overline{B}$, C and $\overline{C}$) for connecting the encoder to the DWI11A and the DWI11A to MOVIAXIS®.

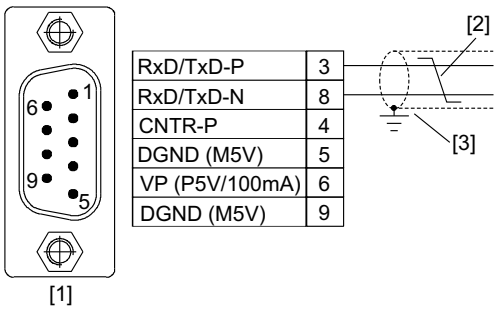
4.14.3 Fieldbus interface option PROFIBUS XFP11A

Terminal assignment

Front view of XFP11A	Description	DIP switch Terminal	Function
	**RUN: PROFIBUS operation LED (green)** **BUS FAULT: PROFIBUS error LED (red)**		Indicates that the bus electronics are operating correctly. Indicates PROFIBUS-DP error.
			Assignment
	X31: PROFIBUS connection	**X31:1** **X31:2** **X31:3** **X31:4** **X31:5** **X31:6** **X31:7** **X31:8** **X31:9**	N.C. N.C. RxD / TxD-P CNTR-P DGND (M5V) VP (P5V/100 mA) N.C. RxD/TxD-N DGND (M5V)
	ADDRESS: DIP switch for setting the PROFIBUS station address	**2^0** **2^1** **2^2** **2^3** **2^4** **2^5** **2^6** **nc**	Significance: 1 Significance: 2 Significance: 4 Significance: 8 Significance: 16 Significance: 32 Significance: 64 Reserved

Connector assignment

Connection to the PROFIBUS network using a 9-pin sub D plug according to IEC 61158. The T-bus connection must be made using a plug with the corresponding configuration.



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[1] 9-pin sub D plug
[2] Signal line, twisted
[3] Conductive connection over a large area between connector housing and shield

MOVIAXIS® – PROFIBUS connection

As a rule, the XFP11A option is connected to the PROFIBUS system using a shielded twisted-pair cable. Observe the maximum supported transmission rate when selecting the bus connector.

The twisted-pair cable is connected to the PROFIBUS connector at pin 3 (RxD/TxD-P) and pin 8 (RxD/TxD-N). Communication takes place via these two contacts. The RS-485 signals RxD/TxD-P and RxD/TxD-N must be connected to the same contacts in all PROFIBUS stations.

The PROFIBUS interface sends a TTL control signal for a repeater or fiber optic adapter (reference = pin 9) via pin 4 (CNTR-P).

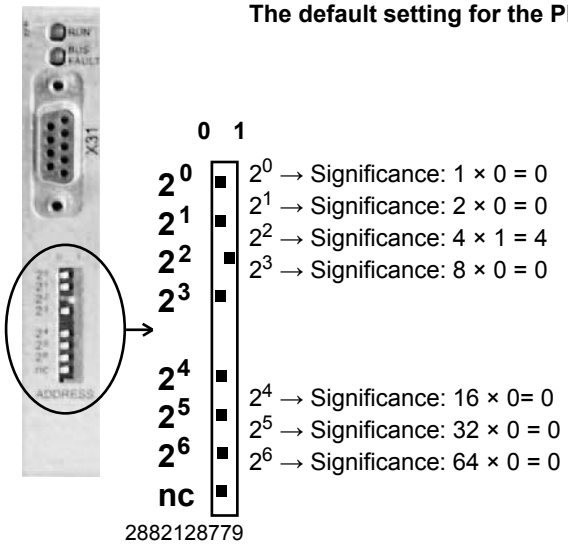
	INFORMATION
	If long bus cables are used, the bus stations must have a "hard" common reference potential.

Baud rates greater than 1.5 Mbaud

The XFP11A option with baud rates > 1.5 Mbaud can only be operated with special 12-Mbaud PROFIBUS connectors.

Setting the station address

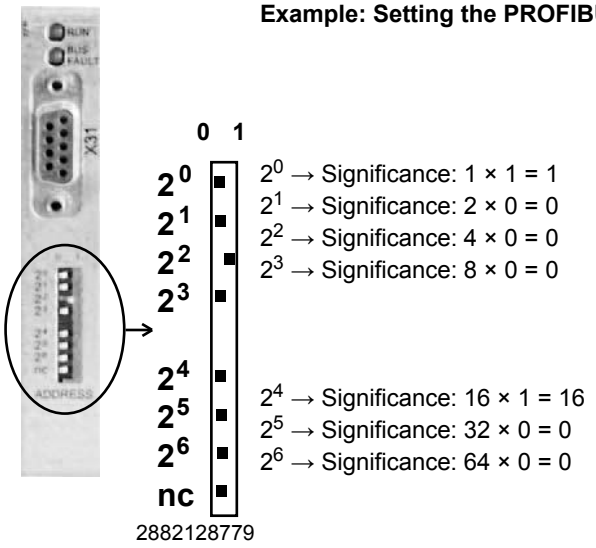
The PROFIBUS station address is set using DIP switches 2^0 – 2^6 on the option card. MOVIAXIS® supports the address range 0 – 125.



The default setting for the PROFIBUS station address is 4:

2^0 → Significance: 1 × 0 = 0
2^1 → Significance: 2 × 0 = 0
2^2 → Significance: 4 × 1 = 4
2^3 → Significance: 8 × 0 = 0
2^4 → Significance: 16 × 0= 0
2^5 → Significance: 32 × 0 = 0
2^6 → Significance: 64 × 0 = 0

Any change made to the PROFIBUS station address during ongoing operation does not take effect immediately. The change takes effect when the servo inverter is switched on again (power supply +24 V OFF/ON).

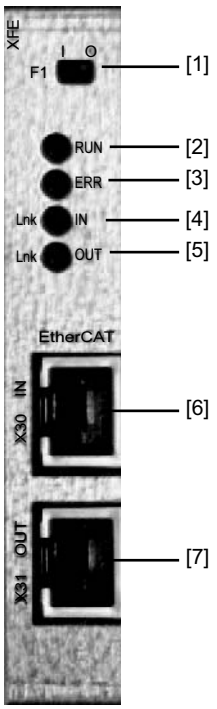


Example: Setting the PROFIBUS station address 17

2^0 → Significance: 1 × 1 = 1
2^1 → Significance: 2 × 0 = 0
2^2 → Significance: 4 × 0 = 0
2^3 → Significance: 8 × 0 = 0
2^4 → Significance: 16 × 1 = 16
2^5 → Significance: 32 × 0 = 0
2^6 → Significance: 64 × 0 = 0

4.14.4 Fieldbus interface option EtherCAT® XFE24A

The XFE24A fieldbus interface is a slave module for connection to EtherCAT® networks. Only one XFE24A fieldbus interface can be installed per axis module. The XFE24A fieldbus interface allows MOVIAXIS® to communicate with all EtherCAT® master systems. All standards of the ETG (EtherCAT® Technology Group), such as wiring, are supported. This means the cables must be wired at the front by the customer.



2882456971

[1] LAM switch
- Switch position 0: All axis modules except the last one
- Switch position 1: Last axis module in the system

Switch F1
- Switch position 0: Delivery state
- Switch position 1: Reserved for added functions

[2] LED RUN; color: Green/orange
[3] LED ERR; color: Red
[4] LED link IN; color: Green
[5] LED link OUT; color: Green
[6] Bus input
[7] Bus output

For more information about the EtherCAT® fieldbus card, refer to the "MOVIAXIS® MX Multi-Axis Servo Inverter XFE24A EtherCAT® Fieldbus Interface" manual.

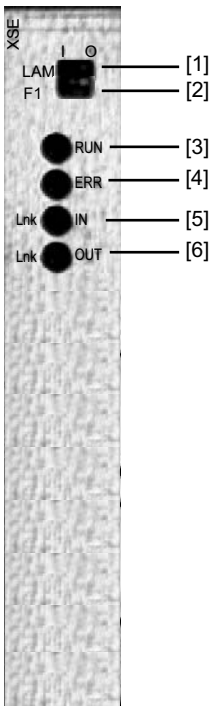
Technical data

XFE24A option (MOVIAXIS®)	
Standards	IEC 61158, IEC 61784-2
Baud rate	100 MBd full duplex
Connection technology	2 × RJ45 (8x8 modular jack)
Bus termination	Not integrated because bus termination is automatically activated.
OSI layer	Ethernet II
Station address	Setting via EtherCAT® master
Vendor ID	0 x 59 (CANopenVendor ID)
EtherCAT® services	• CoE (CANopen over EtherCAT®) • VoE (Simple MOVILINK® Protocol over EtherCAT®)
Firmware status of MOVIAXIS®	Firmware status 21 or higher
Tools for startup	• PC program MOVITOOLS® MotionStudio from version 5.40

4.14.5 XSE24A EtherCAT®-compatible system bus option

The EtherCAT®-compatible system bus XSE24A is an optional, axis-internal expansion module. This module implements the functionality of an EtherCAT®-compatible high-speed system bus for MOVIAXIS®. The XSE24A option module is no fieldbus interface. It cannot be used for communication with non-SEW EtherCAT® masters.

Analog to the wiring of the CAN system bus, the system is connected using the RJ45 plug connection on the top of the unit included in the standard scope of delivery. The CAN system bus is not available when XSE24A is used.



2882542731

[1] LAM switch
- Switch position 0: All axis modules except the last one
- Switch position 1: Last axis module in the system

[2] Switch F1
- Switch position 0: Delivery state
- Switch position 1: Reserved for added functions

[3] LED RUN; color: Green/orange

[4] LED ERR; color: Red

[5] LED link IN; color: Green

[6] LED link OUT; color: Green

4.14.6 Optional input/output card type XIO11A

	INFORMATION
	For information about the ground designations used in the following wiring diagrams, refer to section "Terminal assignment" on the next page.

Supply

- The logic of the module is supplied by MOVIAXIS®.
- Binary inputs and outputs are supplied via the DCOM and 24 V terminals on the front. The supply voltage must be fused with 4 A, see also chapter "UL-compliant installation".
- The binary inputs and outputs are electrically isolated from the logic supply.

Module behavior

Short circuit

In the event of a short circuit of a binary output, the driver will change to pulse mode and in this way protects itself. The status of the binary output does not change.

Once the short-circuit is eliminated, the status of the binary output is that which is output by MOVIAXIS® at that moment.

Switching inductive loads

- The module does not contain an internal free-wheeling diode for receiving inductive energies when inductive loads are switched off.
- The inductive load per output is 100 mJ at a frequency of 1 Hz.
- The inductive energy is converted into heat energy in the switching transistor. A voltage of 47 V is present. In this way, the energy can be reduced faster than by using a free-wheeling diode.
- The load capacity of the outputs through inductive loads can be increased by adding an external free-wheeling diode. However, switching off will take considerably longer.

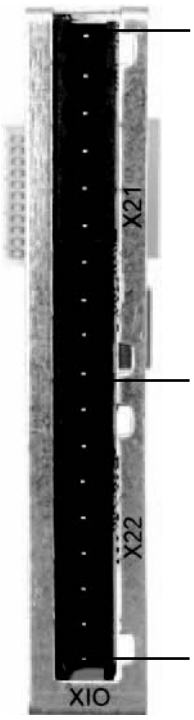
Switching binary outputs in parallel

Connecting two binary outputs in parallel doubles the nominal current.

Cable length

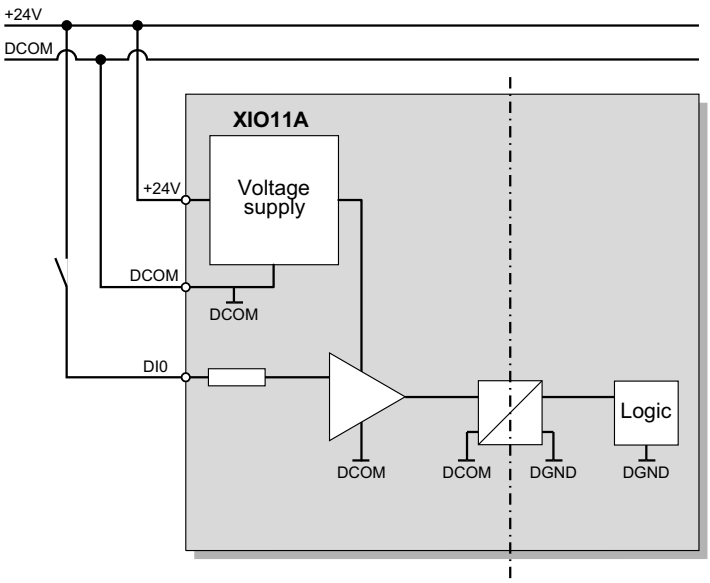
- The maximum cable length of connections on the inputs and outupts is 30 m outside the control cabinet, and 10 m inside the control cabinet.
- If you route the cables outside the control cabinet, you have to shield them irrespective of their length.

Terminal assignment

	Designation	Terminal	Plug	Plug size
 2882694795	DCOM	1	X21	COMBICON 5.08 One core per terminal: 0.20 - 1.5 mm^2 Two cores per terminal: 0.25 - 1.5 mm^2
	+24 V	2		
	DO 0	3		
	DO 1	4		
	DO 2	5		
	DO 3	6		
	DO 4	7		
	DO 5	8		
	DO 6	9		
	DO 7	10		
	DI 0	1	X22	
	DI 1	2		
	DI 2	3		
	DI 3	4		
	DI 4	5		
	DI 5	6		
	DI 6	7		
	DI 7	8		

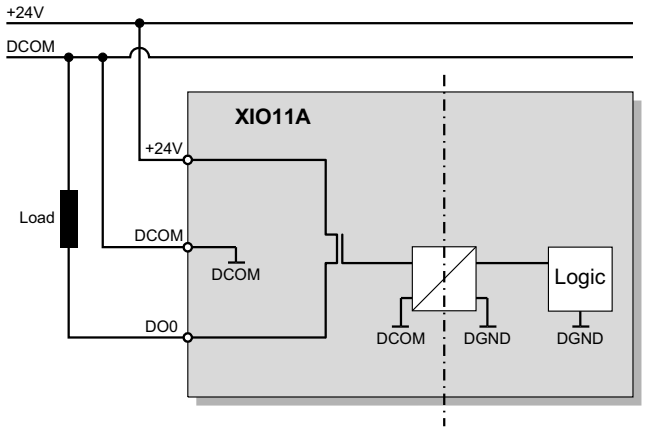
Connection diagram

Wiring the binary inputs



2882697867

Switching the binary outputs



2882701195

	INFORMATION
	It the 24 V supply for the outputs is disconnected, the inputs will not function any longer.

4.14.7 Optional input/output card type XIA11A

	INFORMATION
	For information about the ground designations used in the following wiring diagrams, refer to section "Terminal assignment" on the next page.

Supply

- The logic of the module is supplied by MOVIAXIS®.
- Analog inputs and outputs are also supplied by MOVIAXIS®.
- Binary inputs and outputs are supplied via the DCOM and 24 V terminals on the front. The supply voltage must be fused with 4 A, see chapter "UL-compliant installation".
- The binary inputs and outputs are electrically isolated from the logic supply.

Module behavior

Short circuit of binary outputs

In the event of a short circuit of a binary output, the driver will change to pulse mode and in this way protects itself. The state of the binary outputs does not change.

Once the short-circuit is eliminated, the state of the binary output is that which is output by MOVIAXIS® at that moment.

Short circuit analog outputs

The analog outputs are sustained short-circuit proof.

In the event of a short circuit, the output current is limited to a value of max. 30 mA. The short-circuit current is not pulsed.

Once there is no longer a short-circuit, the setpoint output voltage is output again, which means the output does not switch off.

Switching inductive loads

- The module does not contain an internal free-wheeling diode for receiving inductive energies when inductive loads are switched off.
- The inductive load per output is 100 mJ at a frequency of 1 Hz.
- The inductive energy is converted into heat energy in the switching transistor. A voltage of -47 V is present. In this way, the energy can be reduced faster than by using a free-wheeling diode.
- The load capacity of the outputs through inductive loads can be increased by adding an external free-wheeling diode. However, switching off will take considerably longer.

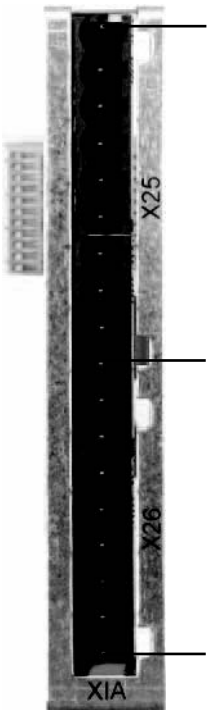
Switching binary outputs in parallel

Connecting two binary outputs in parallel doubles the nominal current.

Cable length

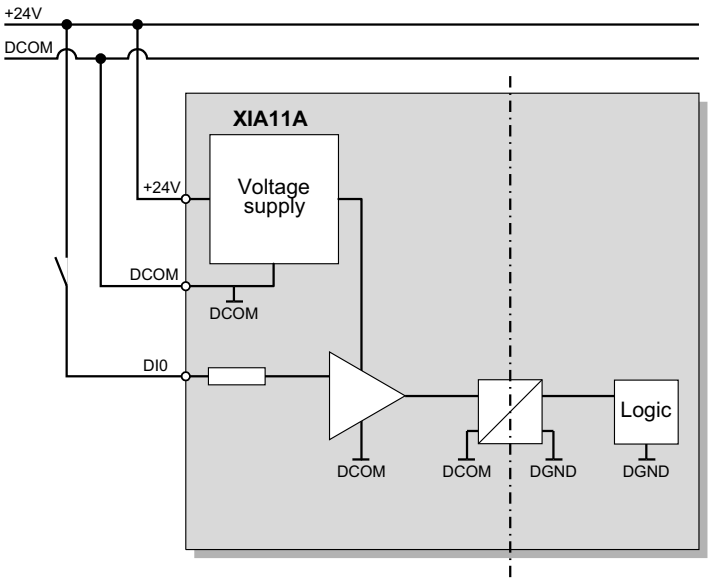
- The maximum cable length of connections on the inputs and outupts is 30 m outside the control cabinet, and 10 m inside the control cabinet.
- If you route the cables outside the control cabinet, you have to shield them irrespective of their length.

Terminal assignment

	Designation	Terminal		
 2883219723	DCOM	1	X25	COMBICON 5.08 One core per terminal: 0.20 - 1.5 mm^2 Two cores per terminal: 0.25 - 1.5 mm^2
	24 V	2		
	DO 0	3		
	DO 1	4		
	DO 2	5		
	DO 3	6		
	DI 0	7		
	DI 1	8		
	DI 2	9		
	DI 3	10		
	AI 0+	1	X26	
	AI 0-	2		
	AI 1+	3		
	AI 1-	4		
	AO 0	5		
	AO 1	6		
	DGND	7		
	DGND	8		

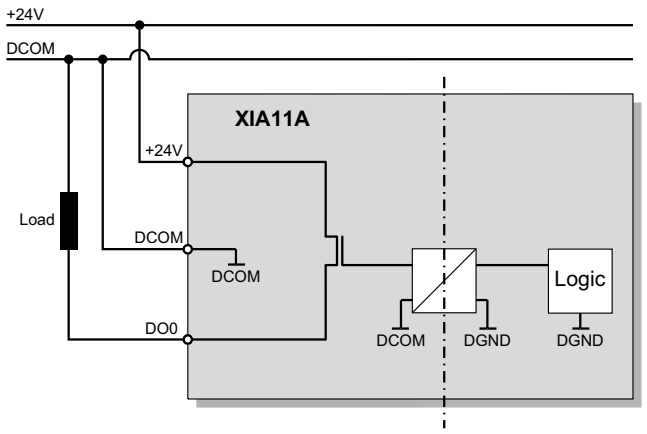
Connection diagram

Wiring the binary inputs



2883419659

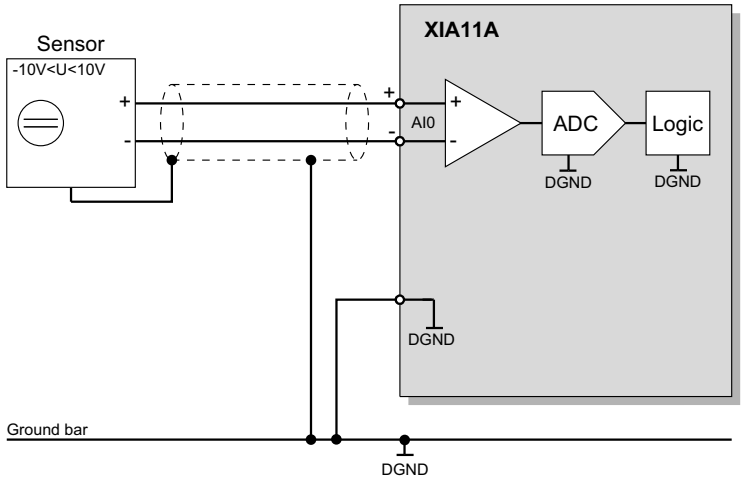
Switching the binary outputs



2883422603

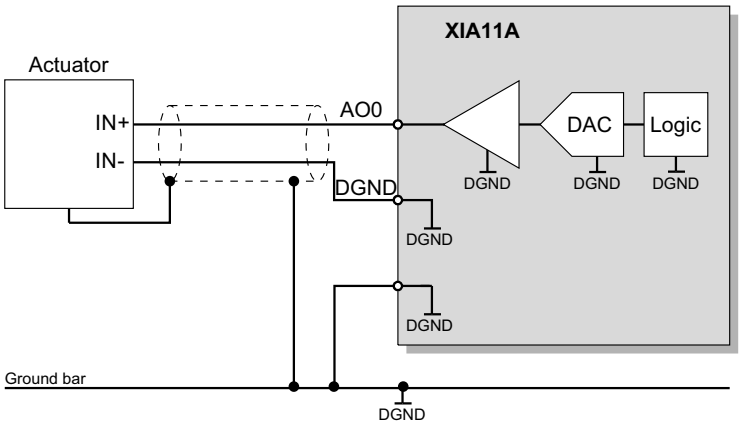
	INFORMATION
	The analog/binary hybrid module XIA11A has no internal free-wheeling diodes.

Wiring the analog inputs



2883425547

Switching the analog outputs



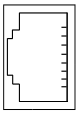
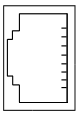
2883428491

	INFORMATION
	The analog/binary hybrid module XIA11A has no internal free-wheeling diodes.

4.14.8 Optional fieldbus interface K-Net XFA11A

The XFA11A (K-Net) fieldbus interface is a slave component for connection to a serial bus system for high-speed data transfer. Install no more than one XF11A fieldbus interface per axis module.

Terminal assignment

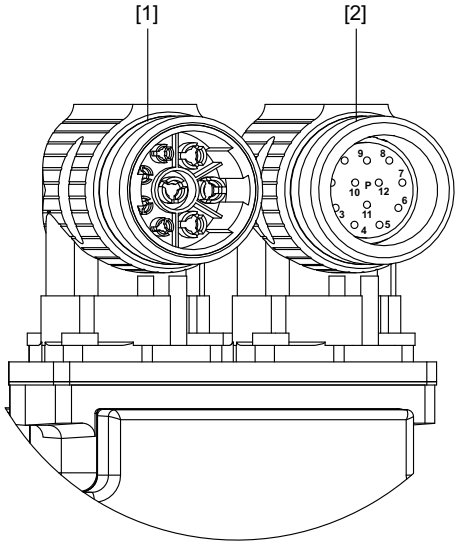
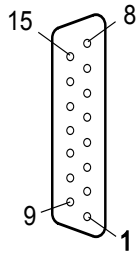
		Brief description	Terminal
		K-Net connection (RJ-45 socket)	**X31**
		K-Net connection (RJ-45 socket)	**X32**

	INFORMATION
	X31 and X32 can be used as either input or output.

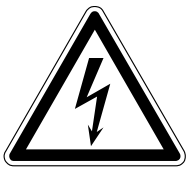
4.15 Connecting encoders to the basic unit

	INFORMATION
	The core colors specified in the wiring diagrams are in accordance with IEC 757 and correspond to the core colors used in the pre-fabricated cables from SEW-EURODRIVE. You will find detailed information in the publication "SEW Encoder Systems". The publication is available from SEW-EURODRIVE.

4.15.1 Example

View of the flange sockets in a servomotor	View connection motor encoder to axis module
 1406539403	 1403604363

[1] Power connection
[2] Encoder connection

	⚠ WARNING
	Dangerous contact voltages at the unit terminals when connecting the wrong temperature sensors. Severe or fatal injuries from electric shock. • Connect only temperature sensors with reliable isolation from the motor winding to the temperature evaluation. Otherwise, the requirements for reliable isolation are not met. Dangerous contact voltages may occur at the unit terminals via the signal electronics in case of an error.

The connector assignment is listed in section "Terminal assignment of the MXA axis modules" (page 90).

4.15.2 General installation notes

Encoder connection

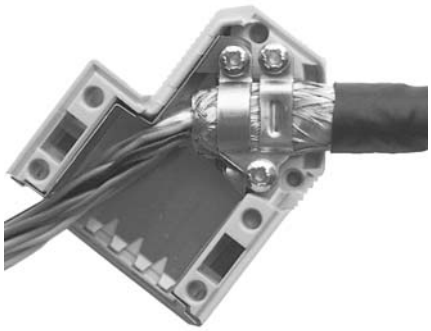
- Max. cable length: 100 m with a capacitance per unit length ≤ 120 nF/km.
- Core cross section: 0.20 – 0.5 mm^2.
- If you do not use a core of the encoder cable: Isolate the core end.
- Use shielded cables with twisted pair conductors and make sure they are grounded on both ends over a large surface area:
  - To the encoder in the cable gland or in the encoder plug,
  - To the servo drive in the housing of the D-sub connector.
- Route the encoder cable separately from the power cables.

4.15.3 Shielding

Connect the shield of the encoder cable over a large area.

At the servo drive

Connect the shield on the servo drive end in the housing of the D-sub connector.



1406541835

On the encoder/ resolver

Connect the shield on the encoder side only on the respective grounding clamps, not on the cable gland.

For drives with a plug connector, connect the shield on the encoder plug.

4.15.4 Prefabricated cables

SEW-EURODRIVE offers prefabricated cables for connecting encoders. SEW-EURODRIVE recommends to use these prefabricated cables.

For detailed information about prefabricated cables, refer to the "MOVIAXIS® Multi-Axis Servo Inverter" catalog.

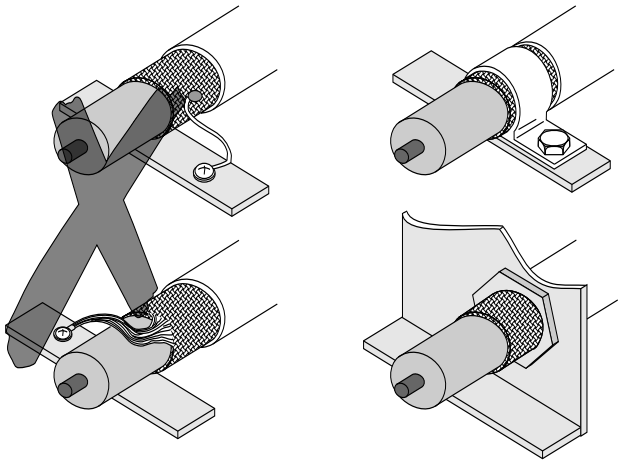
4.16 Notes on electromagnetic compatibility

4.16.1 Separate cable ducts

- Route **power cables** and **electronic cables** in **separate cable ducts**.

4.16.2 Shielding and grounding

- Only use **shielded control cables**.
- Apply the **shield by the shortest possible route and make sure it is grounded over a wide area at both ends**. This also applies to cables with several shielded core strands.



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- **Shielding** can also be achieved by laying the cables in **grounded sheet metal ducts or metal pipes**. **Always install the power and signal lines separately.**
- Ground the **multi-axis servo drive** and **all additional devices to meet the high-frequency guidelines**. You achieve this, e. g. through a wide area metal-on-metal contact between the unit housing and ground, for example by means of unpainted control cabinet mounting panels.

4.16.3 Line filter

- Install the **line filter close to the servo drive** but outside the minimum clearance for cooling.
- Do not switch between the line filter and the MOVIAXIS® multi-axis servo inverter.
- Keep the **length of the cable between the line filter and servo drive to an absolute minimum**, and never more than 600 mm. Unshielded, twisted cables are sufficient. Use unshielded cables for the supply system lead as well. Shielded cables must be used for cables longer than 600 mm.
- **No EMC limits are specified for interference emission** in **voltage supply systems without grounded star point** (IT systems). The **effectiveness of input filters** in IT systems is **severely limited**.

4.16.4 Interference emission

SEW-EURODRIVE recommends the following EMC measures to limit interference emission:

- **On the power system:**
  - Select line filters according to the assignment tables of braking resistors and line filters in the "Technical Data" chapter.
- **On the motor end:**
  - Shielded motor cables.
- **Braking resistor:**
  - You find notes on the selection of braking resistors in the "MOVIAXIS® Multi-Axis Servo Inverter" system manual in the "Project Planning" chapter.

4.16.5 Interference emission categories

Compliance with category "C2" according to EN 61800-3 has been tested on a specified test setup when the following measures are adhered to:

- Servo inverters are installed in a control cabinet with galvanized mounting plate according to the rules for EMC compliant installation
- An associated line filter is used
- Shielded SEW motor cables are used

SEW-EURODRIVE can provide detailed information on request.

⚠ WARNING

This product can cause high-frequency interferences in residential areas which can require measures for interference suppression.

4.17 UL-compliant installation

Note the following points for UL-compliant installation:

- Use only copper cables with the temperature range 60/75 °C as connection cables.
- Permitted tightening torques for MOVIAXIS® power terminals:

4.17.1 Permitted tightening torques

	Tightening torque	
Supply module	**Line connection X1**	**Braking resistor terminals**
Size 1	0.5 – 0.6 Nm	0.5 – 0.6 Nm
MXP81	0.5 – 0.6 Nm	0.5 – 0.6 Nm
Size 2	3.0 – 4.0 Nm	3.0 – 4.0 Nm
Size 3	6.0 – 10.0 Nm	3.0 – 4.0 Nm
Supply and regenerative module		
MXR[1)]	6.0 – 10.0 Nm	3.0 – 4.0 Nm
Axis module	**Motor connection X2**	**---**
Size 1	0.5 – 0.6 Nm	---
Size 2	1.2 – 1.5 Nm	---
Size 3	1.5 – 1.7 Nm	---
Size 4	3.0 – 4.0 Nm	---
Size 5	3.0 – 4.0 Nm	---
Size 6	6.0 – 10.0 Nm	---
DC link discharge module	**Braking resistor connection X15**	**---**
All sizes	3.0 – 4.0 Nm	---

1) For detailed information about MXR, refer to the "Supply and Regenerative Module" manual"

Tightening torque	
of the signal terminals X10, X11	0.5 – 0.6 Nm
of the DC link bus connection X4	3.0 – 4.0 Nm
of the safety relay terminals X7, X8	0.22 – 0.25 Nm
of the brake connection terminals X6 of the axis modules	0.5 – 0.6 Nm
of the 24 V voltage supply terminals	0.5 – 0.6 Nm
of the terminals X61 for multi-encoder cards XGH, XGS	0.22 – 0.25 Nm
of the terminals X21, X22, X25, X26 of the input/output cards XIO, XIA	0.5 – 0.6 Nm

NOTICE

Servo inverter can possibly be damaged!

- Only use the stipulated connection elements and observe the prescribed tightening torques. Otherwise, excessive heat can develop which would damage the MOVIAXIS® multi-axis servo inverter.

4.17.2 Other UL requirements

- MOVIAXIS® MX multi-axis servo inverters are suitable for operation in voltage networks with earthed star point (TN and TT networks), a maximum line current of 42000 A and a maximum line voltage of AC 500 V.
- The maximum permitted value of the line fuse is:

MXP supply module	10 kW	25 kW	50 kW	75 kW
Input fuse	20 A	40 A	80 A	125 A

- Only use melting fuses as input fuses.
- If you use cable cross sections that are dimensioned for a smaller current than the nominal current of the unit, make sure that the fuse is dimensioned for the used cable cross section.
- For information on selecting cable cross sections, refer to the system manual.
- Comply with the country-specific installation regulations in addition to the above notes.
- The plug-in connections of the 24 V supply are limited to 10 A.
- Option cards that are supplied via the 0 V and 24 V terminals at the front must be protected individually or in groups by 4 A melting fuses to UL 248.

INFORMATION

UL certification does not apply to operation in voltage supply systems without earthed star point (IT systems).

5 Startup

5.1 General

⚠ DANGER

Uncovered power connections.

Severe or fatal injuries from electric shock.

- Install the protective covers at the modules, see chapter "Protective covers and touch guards" (page 56).
- Install the touch guards as instructed, see chapter "Protective covers and touch guards" (page 56).
- Never startup the MOVIAXIS® multi-axis servo inverter if the protective covers and touch guards are not installed.

5.1.1 Prerequisite

The drive must be configured correctly to ensure that startup is successful. Refer to the "MOVIAXIS® Multi-Axis Servo Inverter" system manual for detailed project planning notes and an explanation of the parameters.

The startup functions described in this section are used to set the multi-axis servo drive so it is optimally adapted to the connected motor and to the given boundary conditions. Startup has to take place according to the instructions in this section.

5.1.2 Hoist applications

⚠ DANGER

Risk of fatal injury if the hoist falls.

Severe or fatal injuries.

- The MOVIAXIS® multi-axis servo inverter may not be used for any safety functions in conjunction with hoist applications. Use monitoring systems or mechanical protection devices to ensure safety.

5.1.3 Power on of axis system

NOTICE

- Observe a minimum switch-off time of 10 s for the relay K11.
- **Do not** turn the power on or off **more than once per minute**!

Irreparable damage to the unit or unforeseeable malfunctions.

The specified times and intervals must be observed.

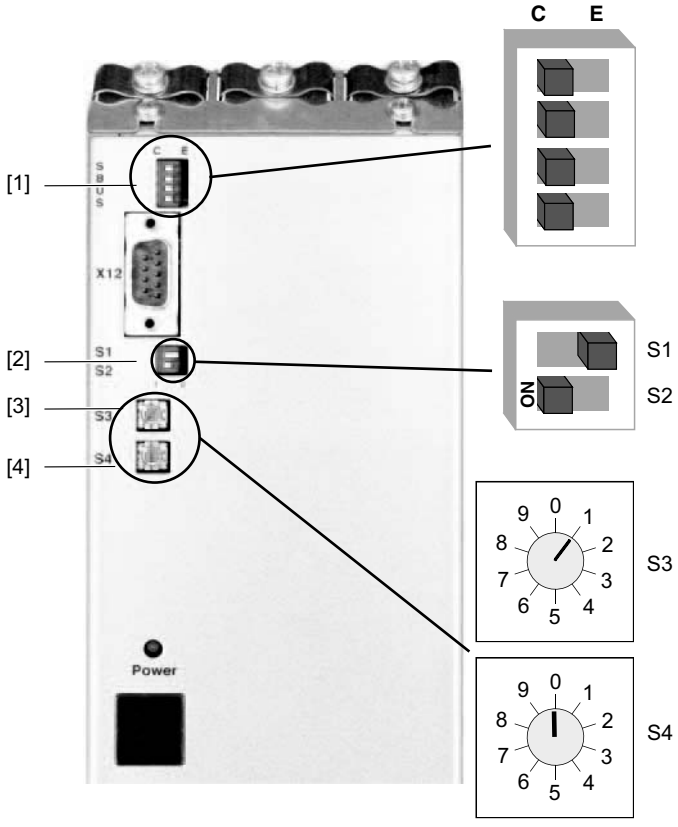
5.1.4 Connecting cables and operating switches

	NOTICE
	Cables may only be connected and switches may only be operated in a de-energized state. Irreparable damage to the unit or unforeseeable malfunctions. De-energize the unit.

5.2 Supply module settings for CAN-based system bus SBus

The following settings are necessary:

- The CAN baud rate is set using the two address switches S1 and S2 on the supply module, see section "Setting the CAN baud rate" (page 130).
- The 4 DIP switches for setting the system bus are set to "C".
- The axis address is set using the two address switches S3 and S4 on the supply module, see section "Setting the CAN axis address" (page 130). The next axis address will be set automatically based on the first address.



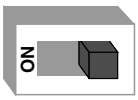
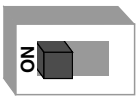
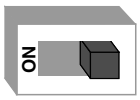
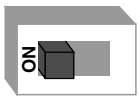
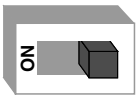
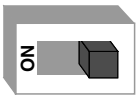
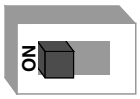
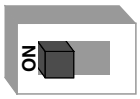
1407811467

[1] DIP switches system bus
[2] S1, S2: DIP switches for CAN baud rate
[3] S3: Axis address switch 10^0
[4] S4: Axis address switch 10^1

For detailed information about assigning an address to a supply and regenerative module, refer to the "MXR Supply and Regenerative Module" manual.

5.2.1 Setting the CAN baud rate

The two DIP switches S1 and S2 have been installed in the supply module for setting the CAN baud rate, see illustration in section "Supply module settings for CAN-based system bus" (page 129).

	125 kbit/s	250 kbit/s	500 kbit/s	1 Mbit/s
S1				
S2				

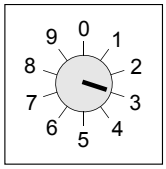
INFORMATION

The default setting upon delivery is 500 kbit/s.

5.2.2 Setting the CAN axis address

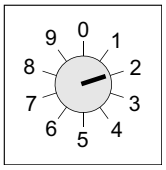
The two rotary switches S3 and S4 have been installed in the supply module for setting the axis address of the axis system, see illustration in chapter "Supply module settings for CAN-based system bus" (page 129). Use these rotary switches to set a decimal address between 0 and 99.

S3 rotary switch



10^0 = ones digit

S4 rotary switch



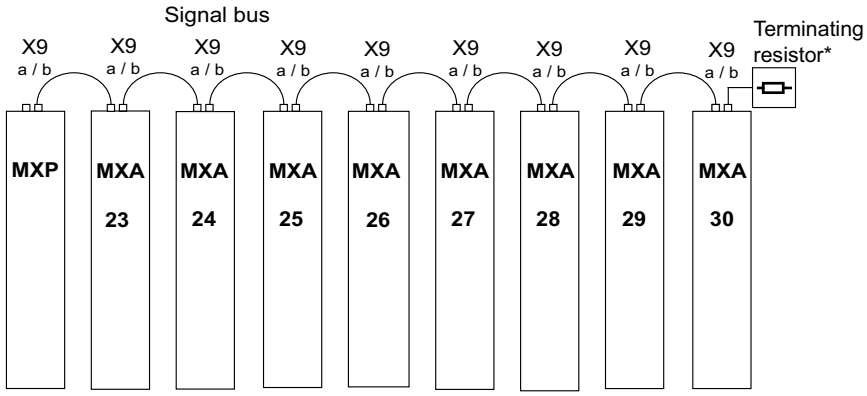
10^1 = tens digit

Axis address "23" is set as an example in the illustration above.

INFORMATION

The default factory setting is "1".

The addresses within the axis system are assigned as follows:



* Terminating resistor only for CAN transmission

In the example, the address of the first axis module is "23". The other axes are assigned addresses in ascending order.

If the axis system includes less than 8 axes, the remaining addresses will not be assigned.

The axis address set this way is used for the addresses of the CAN communication (part of the system bus) or the K-Net fieldbus interface option XFA11A. The axis addresses are assigned only once during startup of the DC 24 V voltage supply of the axis system.

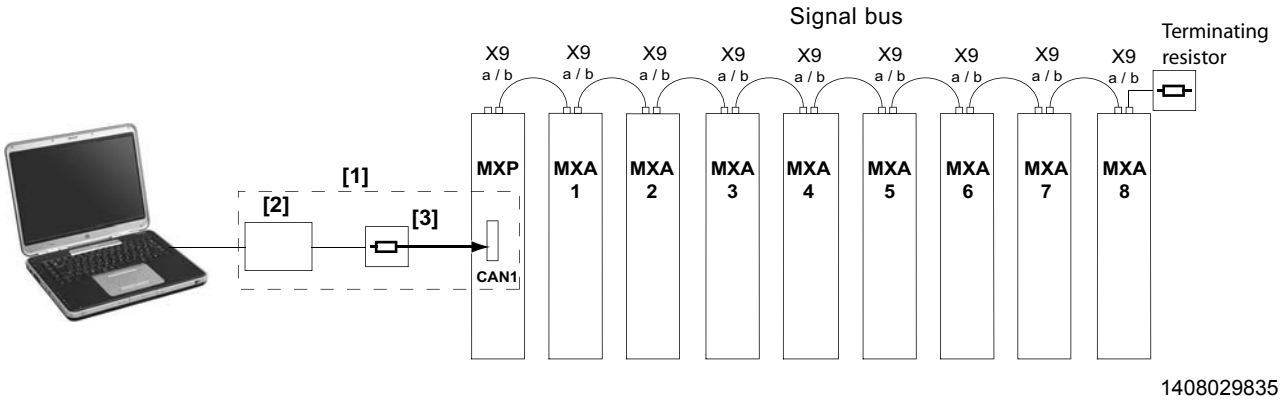
The basic addresses are only changed during operation when the axis module is start up again (24 V supply voltage on/off).

5.2.3 Bus terminating resistors for CAN-based system bus SBus

The CAN-based system bus connects the supply module with the axis module. This CAN bus requires a terminating resistor.

The following figure shows a schematic representation of the CAN communication and the respective position of the terminating resistor.

The terminating resistor is a standard accessory of the supply module (page 21).



[1] Connection cable between PC and CAN interface on the supply module. The connection cable consists of the USB-CAN interface [2] and the cable with integrated terminating resistor [3].

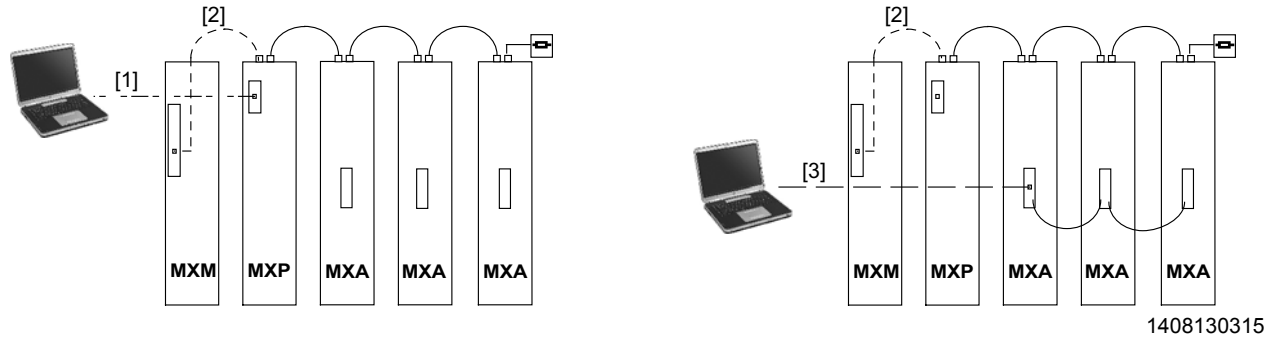
[2] USB-CAN interface

[3] Cable with integrated terminating resistor (120 Ω between CAN_H and CAN_L)

For more information on communication between the PC and the MOVIAXIS® system, refer to chapter "Communication via CAN adapter" (page 139).

5.3 Communication selection

The following figures show the possible access types for the system buses of the unit system.



[1] PC-CAN to CAN-based system bus SBus
[2] Master module with CAN-based system bus SBus/EtherCAT®-compatible system bus SBus^{plus}
[3] PC-CAN to CAN-based application bus CAN2

SEW-EURODRIVE recommends the following communication paths:

- Unit system without master module: CAN
- Unit system with master module and DHE/DHF/DHR/UFx: TCP/IP or USB

Use the following table to select the type of communication for startup depending on the unit configuration.

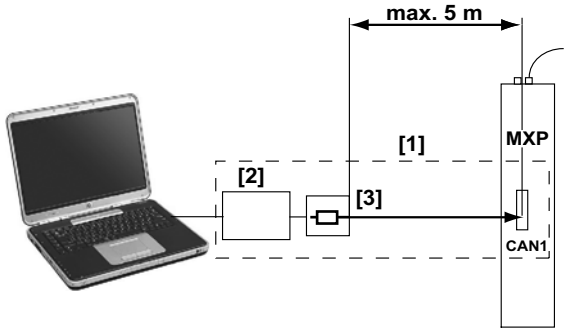
Hardware configuration of the unit system	Access to							Access via
	Master module						Supply module	Axis modules
	Via communication interface ...							
	PROFIBUS	CAN	RS485	TCP/IP	USB	RT	CAN[1)]	CAN2[2)]
Without master module							x	x
Master module + DHE		x	(x)	x	x			x
Master module + DHF/UFx41	x[3)]	x	(x)	x	x			x
Master module + DHR/UFx41		x	(x)	x	x	x[4)]		x

1) CAN-based system bus
2) Only if CAN2 if free for engineering
3) Only for operation for PROFIBUS DP
4) Real-time Ethernet parameter channel via controller

5.4 CAN-based application bus CAN2 – information and settings

5.4.1 Connections and PC diagnostics at the supply module

	INFORMATION
	CAN connections shall only be implemented in the control cabinet to avoid potential shifts.



1407830539

[1] Connection cable between PC and CAN interface on the supply module. The connection cable consists of the USB-CAN interface [2] and the cable with integrated terminating resistor [3].

[2] USB-CAN interface [3] Cable with integrated terminating resistor (120 Ω between CAN_H and CAN_L)

The maximum permitted cable length between terminating resistor and supply module is 5 m.

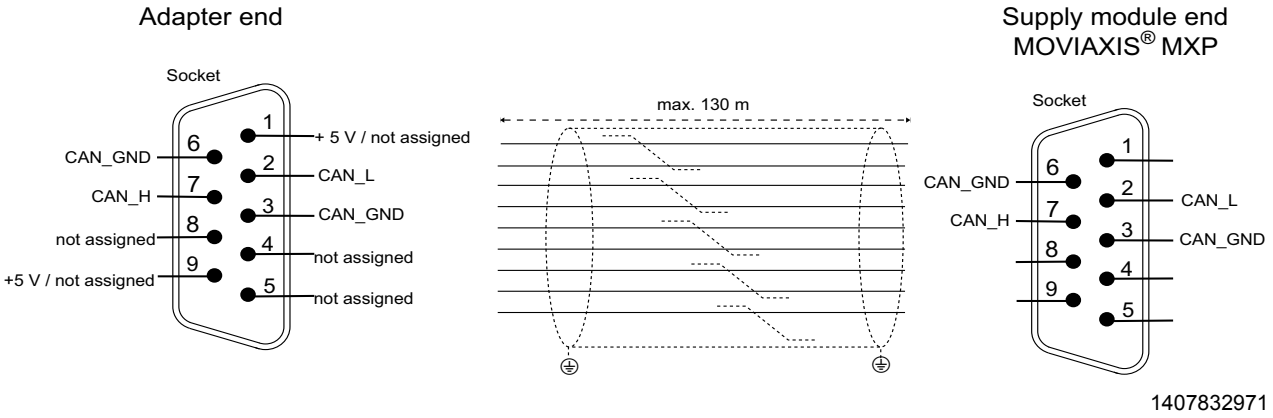
	INFORMATION
	Observe the notes of the cable manufacturer on CAN suitability when selecting the cable.

For more information on communication between the PC and the MOVIAXIS® system, refer to chapter "Communication via CAN adapter" (page 139).

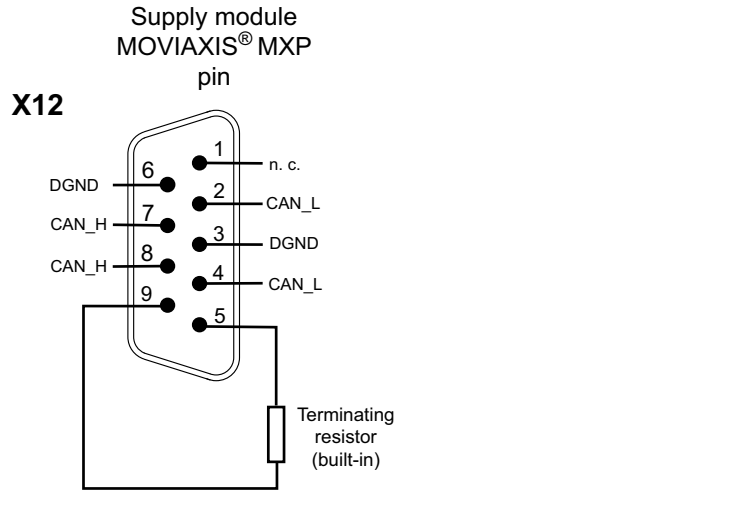
5.4.2 Connecting CAN cables to the supply module

Connection assignment of connection and extension cables

The **connection and extension cable** between the CAN adapter and the axis system comes equipped with a 9-pin D-sub socket on both ends, see chapter "Communication via CAN adapter" (page 139). The pin assignment of the connection cable with the 9 pin D-sub CAN connector is shown in the following figure.

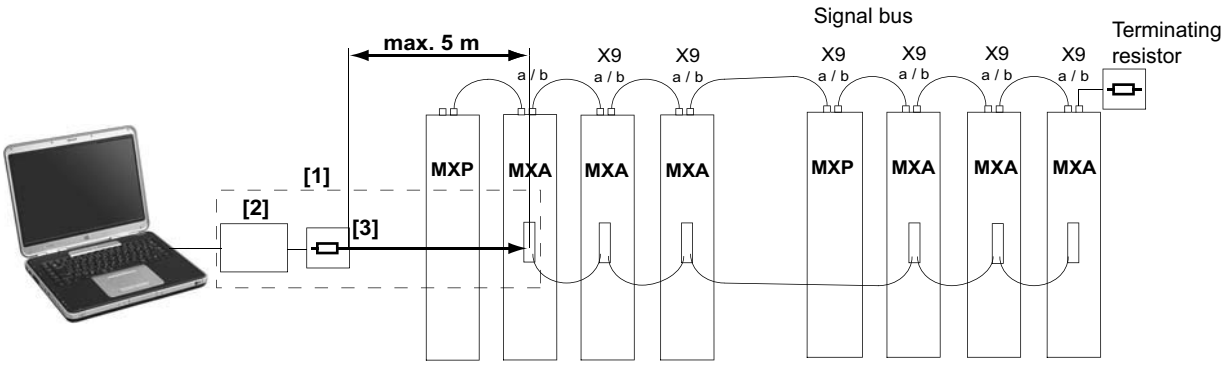


Connection assignment of X12 (pin) on the supply module



5.4.3 Connections and PC diagnostics at the axis module

	INFORMATION
	CAN connections shall only be implemented in the control cabinet to avoid potential shifts.



1408034443

[1] Connection cable between PC and CAN interface on the axis module. The connection cable consists of the USB-CAN interface [2] and the cable with integrated terminating resistor [3].

[2] USB-CAN interface

[3] Cable with integrated terminating resistor (120 Ω between CAN_H and CAN_L)

The maximum permitted cable length between terminating resistor and the first axis module is 5 m.

	INFORMATION
	For the connection between the axis systems, please use pre-fabricated cables from SEW-EURODRIVE.

For more information on communication between the PC and the MOVIAXIS® system, refer to chapter "Communication via CAN adapter" (page 139).

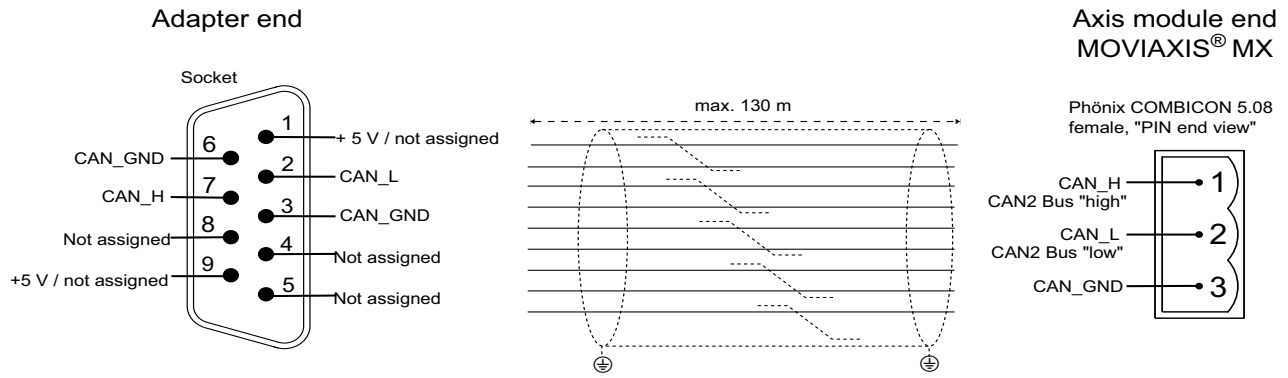
5.4.4 Setting the CAN2 axis address

All axis modules are set to address "0" at the factory. Each axis module must be given a CAN2 axis address by means of parameter setting.

5.4.5 Connecting CAN2 cables to the axis modules

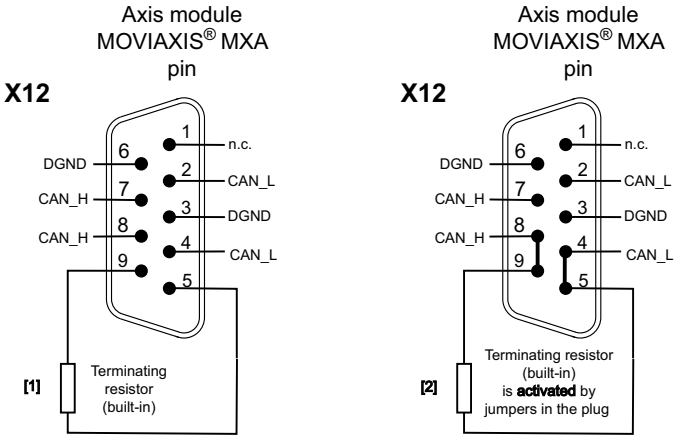
Connection assignment of connection and extension cables

The **connection and extension cable** between the CAN adapter and the axis system comes equipped with a 9-pin D-sub socket on both ends, see chapter "Communication via CAN adapter" (page 139). The pin assignment of the connection cable with the 9 pin D-sub CAN connector is shown in the following figure.



1408036875

Connection assignment of X12 (pin) on the axis module



1408118539

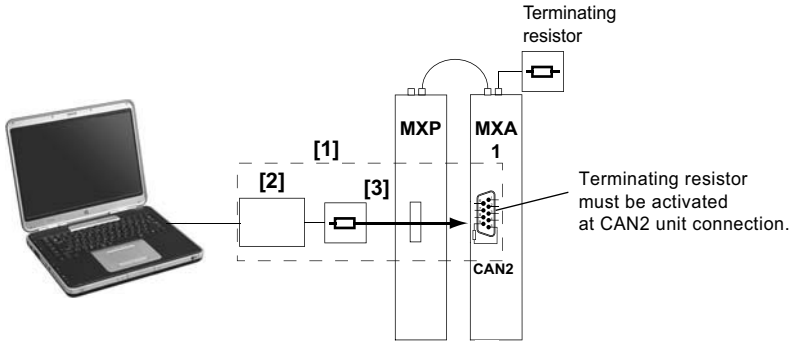
[1] Terminating resistor not active
[2] Terminating resistor active

5.4.6 Bus terminating resistor for CAN2 bus connection

The CAN-based application bus CAN2 connects the supply module with the axis module. The CAN2 bus requires a terminating resistor.

The following figure shows the diagram of possible combinations for CAN communication and the respective position of the terminating resistor.

The terminating resistor is a standard accessory of the supply module .



1408123019

[1] Connection cable between PC and CAN interface on the axis module. The connection cable consists of the USB-CAN interface [2] and the cable with integrated terminating resistor [3].

[2] USB-CAN interface [3] Cable with integrated terminating resistor (120 Ω between CAN_H and CAN_L)

	INFORMATION
	Install terminating resistor. The terminating resistor in the last axis module of the axis system must be activated, see chapter Connecting CAN2 cables to the axis modules" (page 137).

For more information on communication between the PC and the MOVIAXIS® system, refer to chapter "Communication via CAN adapter" (page 139).

5.5 Communication via CAN adapter

For communication between a PC and a MOVIAXIS® system, we recommend using the CAN adapter from SEW-EURODRIVE, which is supplied with a pre-fabricated cable and a terminating resistor. The part no of the CAN adapter is 18210597.

As an alternative, the CAN adapter "USB Port PCAN-USB ISO (IPEH 002022)" from the company Peak can be used.

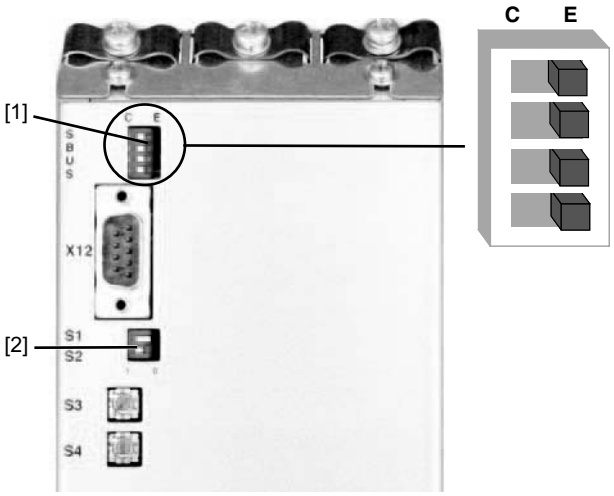
- In case you design the terminals yourself, you must install a terminating resistor of 120 Ω between CAN_H and CAN_L.
- For secure data transmission, you also need a shielded cable suitable for CAN networks.
- There are two communication paths for the axes in the axis system:
  1. Via the 9-pin D-sub connector X12 on the supply module (CAN-based SBus), see chapter "Connecting CAN cables to the supply module" (page 135).
  2. Via the 9-pin D-sub connector X12 to an axis module of the system (CAN-based application bus CAN2), see chapter "Connecting CAN2 cables to the axis modules" (page 137).

	INFORMATION
	Cable connection and cable extension SEW-EURODRIVE recommends using **connection and extension cables** with **1:1 through-connection** in **shielded** design. Observe the notes of the cable manufacturer on CAN suitability when selecting the cable.

5.6 Settings for EtherCAT®-compatible system bus SBus*plus*

Please note the following when using an EtherCAT®-compatible system bus:

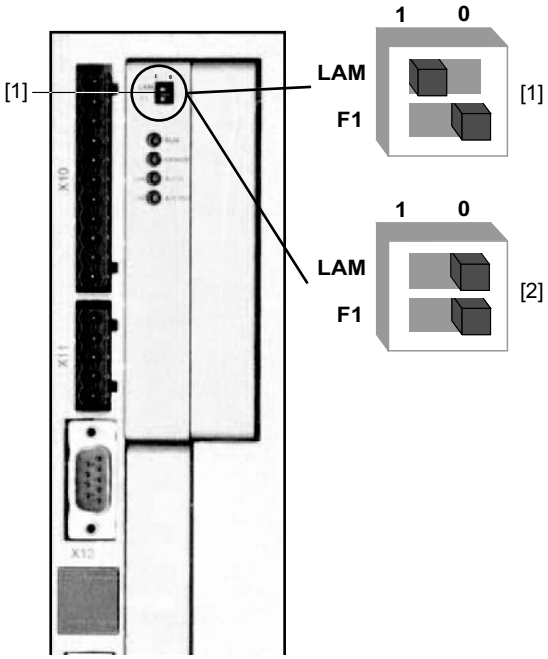
- Set the 4 DIP switches on the supply module to position "E".



1408125451

[1] Settings for EtherCAT® operation: All 4 switches set to "E"
[2] DIP switches S1, S2, S3 and S4 and X12 have no functions

- In this variant, switches S1, S2, S3 and S4 as well as terminal X12 on the supply module do not have any function.
- Set the DIP switch LAM to **setting "1"** at the **last** axis module in the system. At all other axis modules, the LAM DIP switch must be set to "0".



1408127883

[1] Setting the LAM DIP switch on the **last** axis module of a system
[2] Setting the LAM DIP switch of all axis modules of a system except for the last axis module

- In this version, X9b does not require a terminating resistor.

5.7 Description of the startup software

The MOVITOOLS® MotionStudio software package is the SEW engineering tool that you can use to access all SEW drive units. For the MOVIAXIS® series, you can use MOVITOOLS® MotionStudio for startup, parameter setting and diagnostics.

For information such as installation instructions and system prerequisites, refer to the "MOVITOOLS® MotionStudio" manual.

5.7.1 Startup software MOVITOOLS® MotionStudio

Once you have installed MOVITOOLS®MotionStudio, you will find the corresponding entries in the WINDOWS start menu at the following path: **"Start\Programs\SEW\MOVITOOLS MotionStudio"**.

	INFORMATION
	For a detailed description of the following steps, please refer to the online help in MOVITOOLS® MotionStudio or to the "MOVITOOLS® MotionStudio" manual.

1. Start MOVITOOLS® MotionStudio.
2. Configure communication channels.
3. Perform an online scan.

5.8 Sequence in case of new startup

There are two different variants for new startup:

- New startup without master module
- New startup with master module and MOVI-PLC®

5.8.1 New startup without master module

1. Startup
   - Motor startup
   - Controller setting
   - User-defined units
   - System and application limits
2. Standard application
   - Technology editor for single-axis positioning (+ monitor)
3. Scope, recording of
   - Currents
   - Speeds
   - Positions
   - etc.
4. Data management
   - Loading and saving data records of individual axes

5.8.2 New startup with master module and MOVI-PLC®

1. Drive startup for MOVI-PLC®
   - Motor startup
   - Controller setting
   - User-defined units
   - System and application limits
2. Scope, recording of
   - Currents
   - Speeds
   - Positions
   - etc.
3. Data management
   - Loading and saving data records of individual axes

5.9 MOVIAXIS® startup – single-motor operation

	INFORMATION
	As a prerequisite for the startup procedure described below, MOVITOOLS® MotionStudio must be installed. Refer to the "MOVITOOLS® MotionStudio" manual for detailed information.

MOVIAXIS® is started up using a startup wizard in MOVITOOLS® MotionStudio.

You can navigate through the startup wizard using the [Next] or [Back] buttons at the bottom right of each window.

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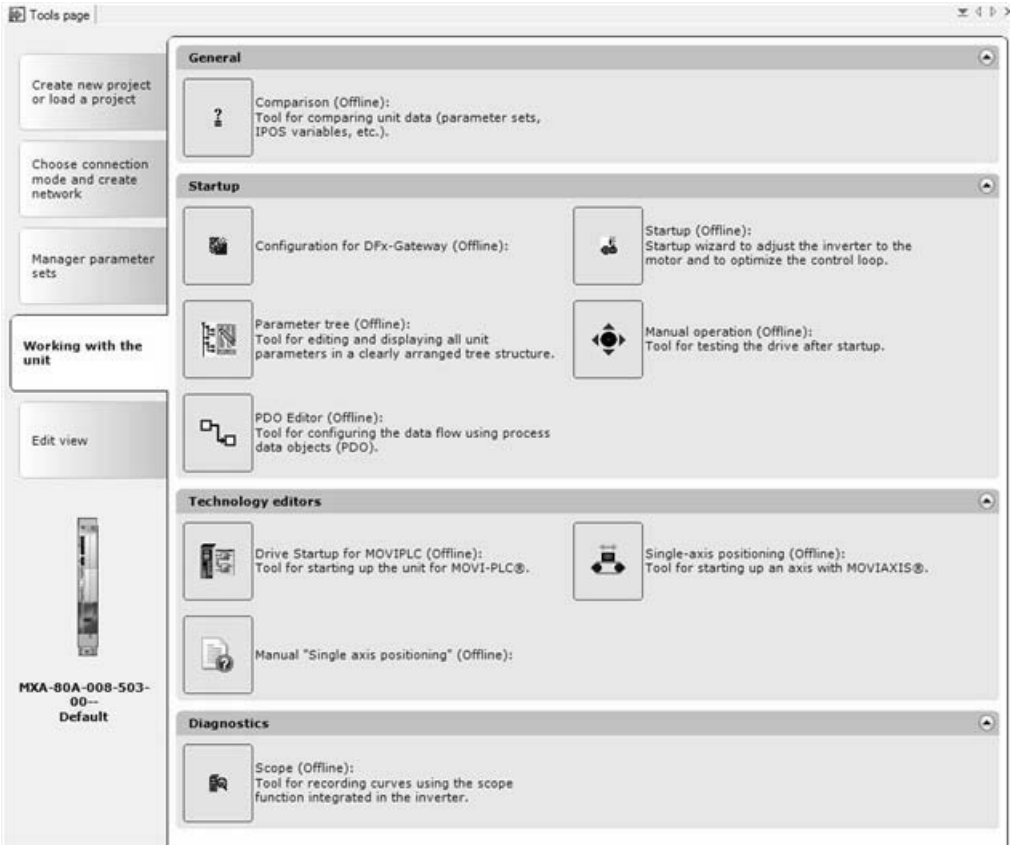
5.9.1 MOVITOOLS® MotionStudio engineering software

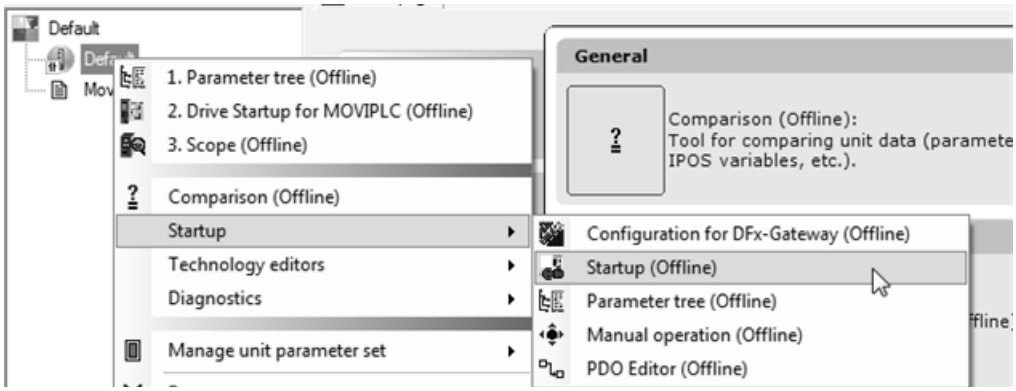
MOVITOOLS® MotionStudio offers two ways for calling the startup wizard.

1. Calling the startup wizard by clicking on the [Startup] button.


Tools page
Create new project or load a project
Choose connection mode and create network
Manager parameter sets
Working with the unit
Edit view
MXA-80A-008-503-00--
Default
General
Comparison (Offline):
Tool for comparing unit data (parameter sets, IPOS variables, etc.).
Startup
Configuration for DFx-Gateway (Offline):
Startup (Offline):
Startup wizard to adjust the inverter to the motor and to optimize the control loop.
Parameter tree (Offline):
Tool for editing and displaying all unit parameters in a clearly arranged tree structure.
Manual operation (Offline):
Tool for testing the drive after startup.
PDO Editor (Offline):
Tool for configuring the data flow using process data objects (PDO).
Technology editors
Drive Startup for MOVIPLC (Offline):
Tool for starting up the unit for MOVI-PLC®.
Single-axis positioning (Offline):
Tool for starting up an axis with MOVIAXIS®.
Manual "Single axis positioning" (Offline):
Diagnostics
Scope (Offline):
Tool for recording curves using the scope function integrated in the inverter.

2541303819

2. Calling the startup wizard by right-clicking on the [Startup] entry in the "Project/network" list.



2541306251

5.9.2 MOVIAXIS® startup

There are 3 parameter records available for startup, which can be assigned to 3 different motors.

You can select the parameter set to be started up in the start menu for motor startup. You can only startup one parameter set at a time, i.e. several parameters sets can only be started up one after the other.

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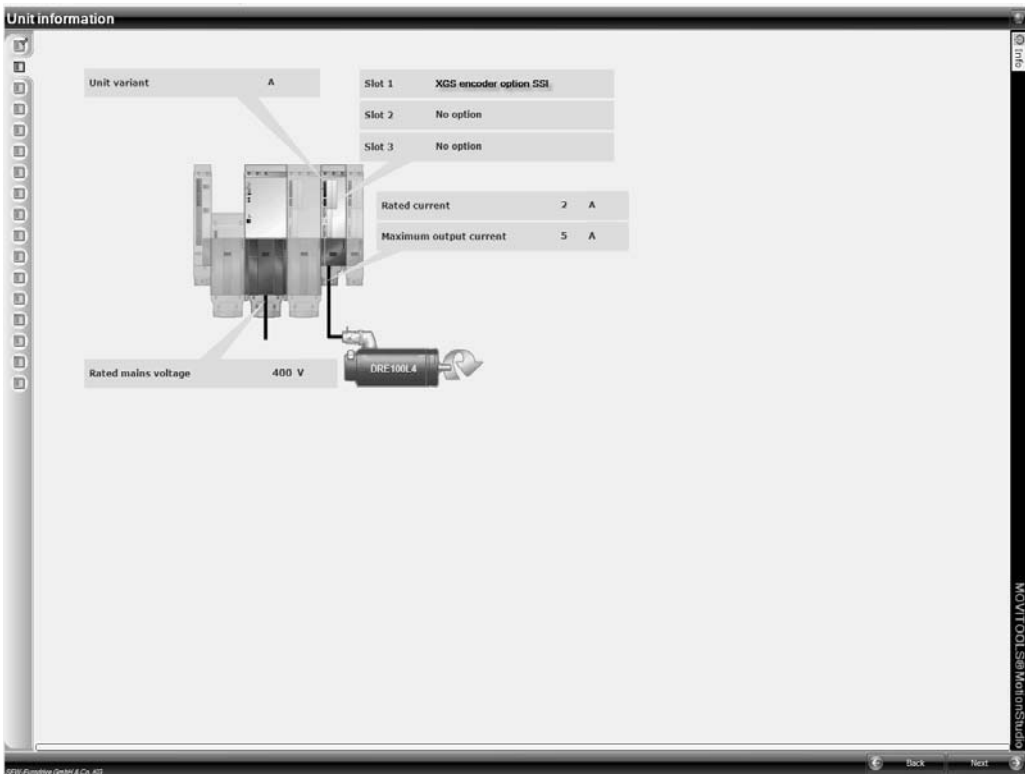
5.9.3 Unit information

This figure shows the current unit information.

The option cards that are plugged into the three possible slots are displayed.



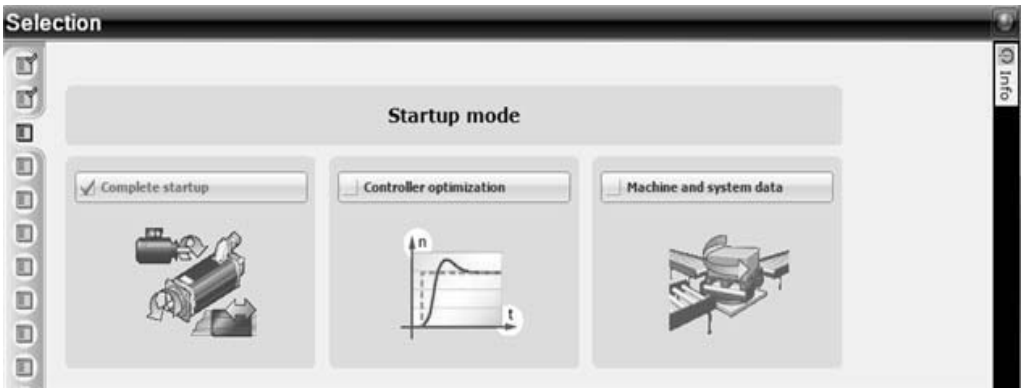
2542163083

The card types of option cards inserted into the card slots are shown in this figure.

In this example:

- Slot 1: XGS encoder option SSI.
- Slot 2: Empty.
- Slot 3: Empty.

5.9.4 Startup mode selection



2542248971

You have three options for startup in the selection menu:

- **Complete startup:**

  This is the setting option for the initial startup. This part of the program stores the information for motor, speed controller as well as machine and system data.

	INFORMATION
	The following setting options "Optimize controller" and "Machine and system data" are subprograms of the MOVIAXIS® MX startup. These setting options can be selected and executed following a "complete startup" only.

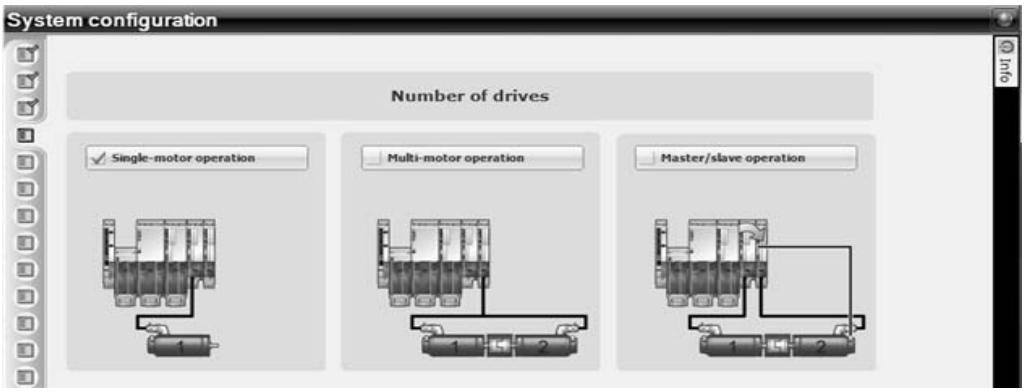
- **Optimization of the speed controller:**

  Direct selection of the startup submenu "Controller". Here, you can adjust or optimize the controller settings. Direct selection only possible if initial startup has already been performed. Description of the controller settings in chapter "Controller" (page 160).

- **Machine and system data:**

  Direct selection of the startup submenu "Axis configuration". Here, you can adjust the user-defined units and the system and application limits. For a description of the machine and system data, see chapter "Axis configuration" (page 167).

5.9.5 System configuration – number of drives



2542315275

Option to select whether one or several motors are coupled with one load.

- **Single-motor operation**

  Only one motor is connected to the servo inverter and coupled with a load.

- **Multi-motor operation**

  Up to six identical motors can be connected to a servo inverter.

  The servo inverter amplifies the torque and the current by the factor (the number) of the connected motors.

  The inductance is reduced by the factor of the motor connected in parallel.

  The following prerequisites must be fulfilled:

  - All motors must be of the same type and have the same winding properties
  - All motors must be coupled with the load without mechanical slip
  - One motor must be equipped with an encoder
  - With synchronous servomotors, the magnetic fields of all rotors must be aligned with each other. Contact SEW-EURODRIVE in such cases.

- **Master/slave operation**

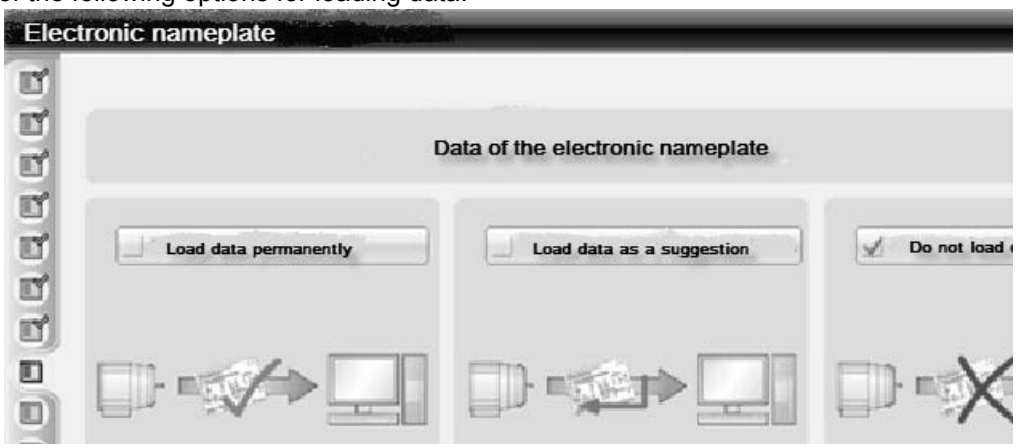
  Up to six identical motors are connected to one servo inverter each and coupled with a shared load. The inertia of the load is distributed over the number of connected motors.

  Depending on the rigidity of the connection between the load and the coupled motors, you must use the appropriate master/slave operating mode:

  - For rigidly coupled motor/load combinations, the slaves must be operated in "Torque control" mode.
  - For non-rigidly coupled motor/load combinations, the slaves must be operated in "Synchronous operation" mode.

5.9.6 Electronic nameplate for SEW encoders

For motors with SEW encoders that have an electronic nameplate, you can select one of the following options for loading data:



2542496523

- **Load data permanently:**

  The motor data stored in the electronic nameplate is read out and used for the motor startup. This data cannot be changed anymore.

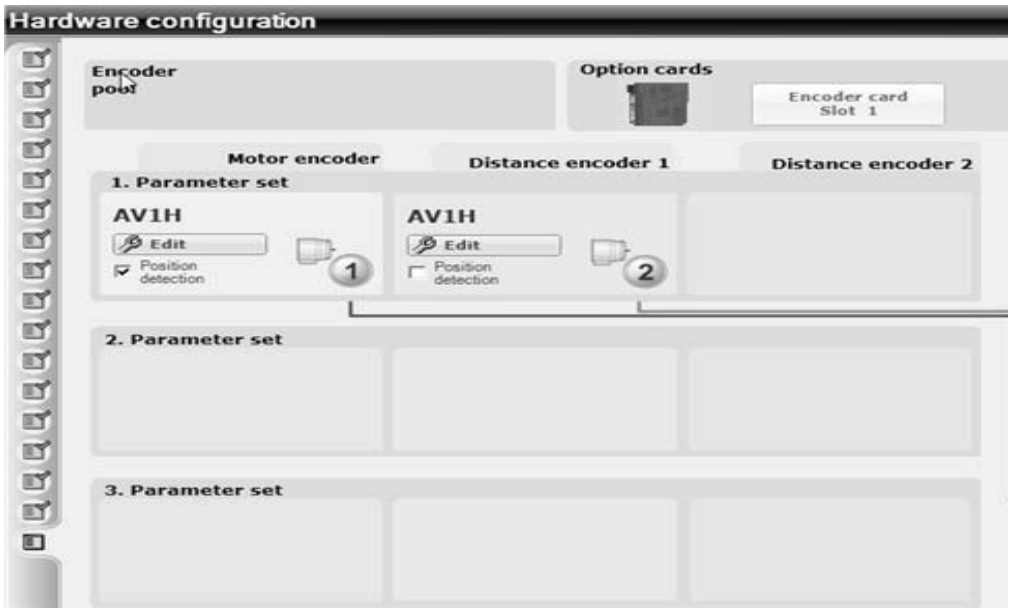
- **Load data as a suggestion:**

  The motor data stored in the electronic nameplate is read out and made available as a "suggestion". This data can be changed.

- **Do not load data:**

  The motor data stored in the electronic nameplate is ignored.

5.9.7 Hardware configuration encoder pool



2543454603

During hardware configuration, the yellow-marked encoders displayed in the encoder pool can be assigned to the individual parameter sets or motors.

In addition, the encoders can be assigned to the columns "Motor encoder", "Distance encoder 1" and "Distance encoder 2". Each encoder can only be used once.

Assign an encoder as follows:

- Click on the required encoder in the "Encoder pool" selection field and hold the left mouse button down to drag the encoder to the intended parameter set. In the above example, encoder 1 of the type AV1H is defined as "Motor encoder".

Encoders in the "Motor encoder" column are always the "Actual speed" sources and thus **tachometers**.

Only one encoder per parameter set can be used for **position detection**. The "Position detection" checkbox must be ticked for the encoder used for position detection.

Each encoder in the columns "Motor encoder", "Distance encoder 1", or "Distance encoder 2" can be assigned for position detection.

In the above example, the encoder AV1H in the "Motor encoder" column is used for position detection.

Displayed encoders of the encoder pool

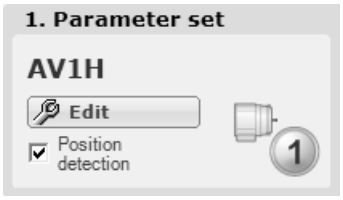
The encoder pool can represent up to 3 physical encoder inputs of the MOVIAXIS® multi-axis servo inverter.

A maximum of 2 multi-encoder option cards (XGH11A / XGS11A) can be plugged in. In the example, only one multi-encoder option card is plugged in. Depending on the number of plugged multi-encoder option cards, the optional encoders 2 and 3 are displayed in the encoder pool in addition to the encoder 1 of the basic unit.

Encoder 1 is always connected to the encoder input of the basic unit. Encoders 2 and 3 are always connected to the respective multi-encoder cards, see chapter "Application examples" (page 171).

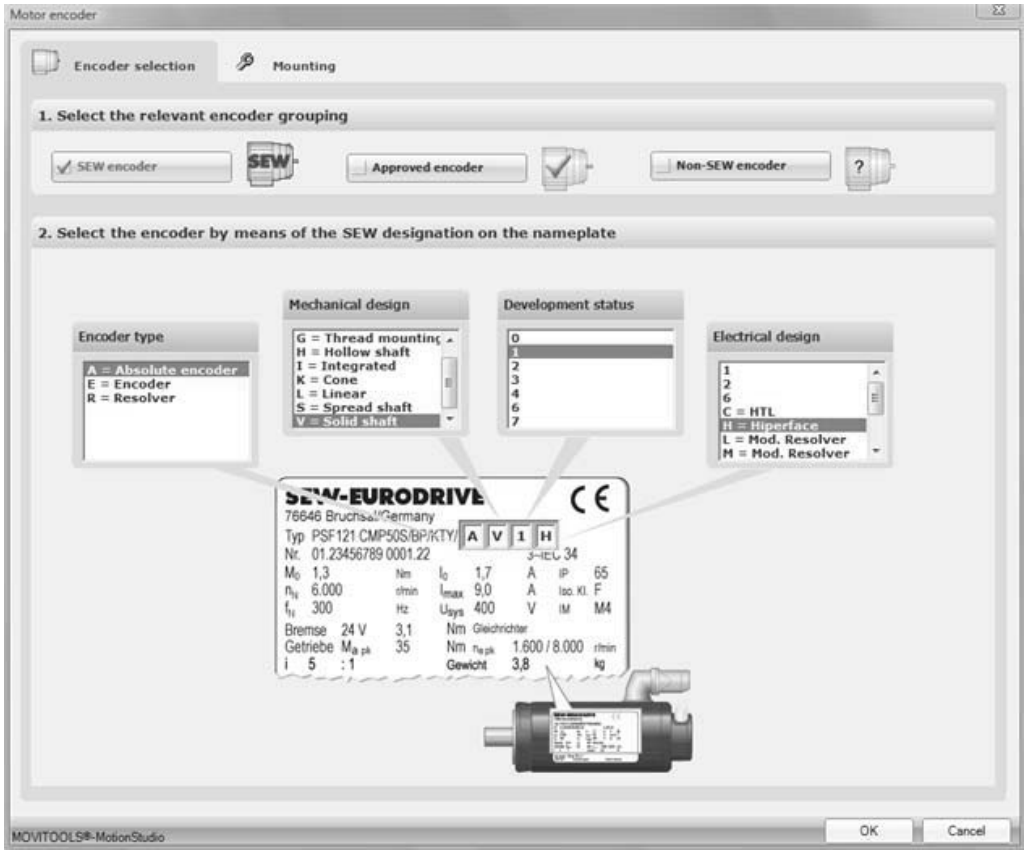
[Edit] button

Click on the [Edit] button to open the [Motor encoder] menu with the submenus [Encoder selection] and [Mounting].



2543747339

[Encoder selection] submenu



2543755275

In the [Encoder selection] submenu, you can select encoders from three categories:

- SEW encoder
- Approved encoder
- Non-SEW encoder

[SEW encoder] button

The [Encoder selection] submenu shows [SEW encoder] as standard, see previous figure (page 150).

In this menu, the SEW designations of the encoders are used.

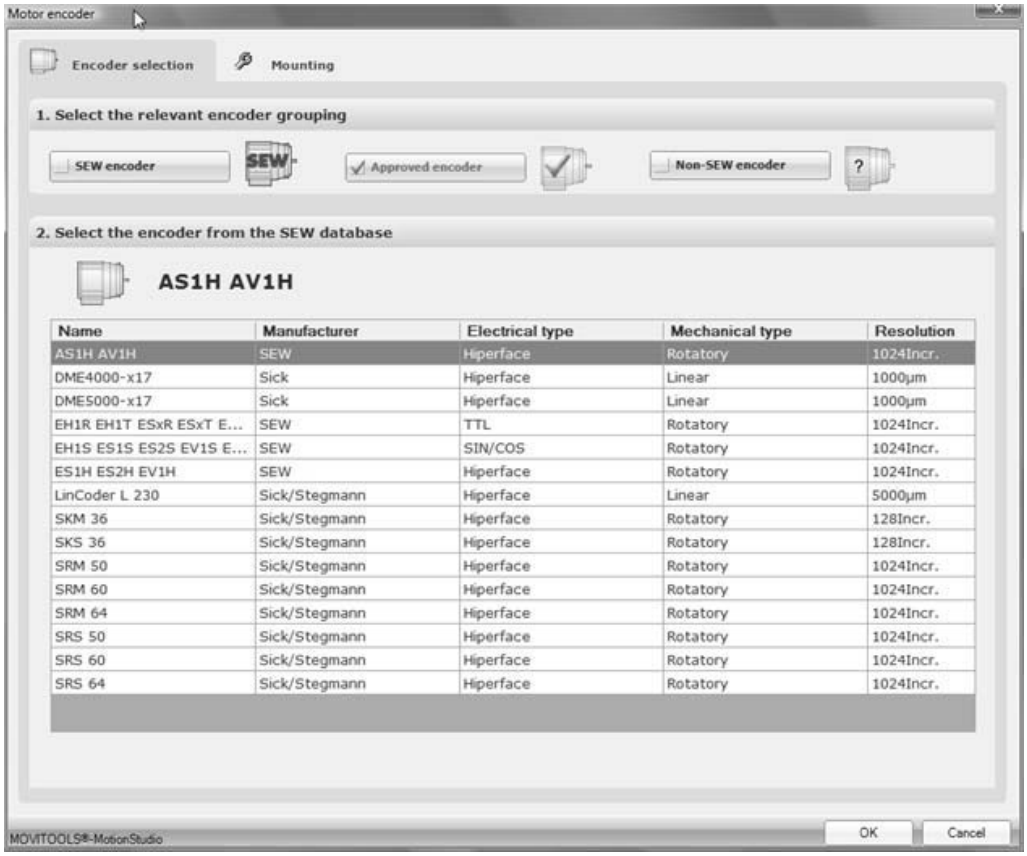
You can define the encoder mounted to the motor using the following selection lists:

- Encoder type
- Mechanical design
- Development status
- Electrical design

The selectable criteria of the used encoder type are specified on the nameplate of the motor.

[Approved encoder] button

Click the [Approved encoder] button to display a current list of all encoders approved by SEW-EURODRIVE.


Motor encoder
Encoder selection
Mounting
1. Select the relevant encoder grouping
SEW encoder
Approved encoder
Non-SEW encoder
2. Select the encoder from the SEW database
AS1H AV1H
Name | Manufacturer | Electrical type | Mechanical type | Resolution
AS1H AV1H | SEW | Hiperface | Rotatory | 1024Incr.
DME4000-x17 | Sick | Hiperface | Linear | 1000µm
DME5000-x17 | Sick | Hiperface | Linear | 1000µm
EH1R EH1T ESxR ESxT E... | SEW | TTL | Rotatory | 1024Incr.
EH1S ES1S ES2S EV1S E... | SEW | SIN/COS | Rotatory | 1024Incr.
ES1H ES2H EV1H | SEW | Hiperface | Rotatory | 1024Incr.
LinCoder L 230 | Sick/Stegmann | Hiperface | Linear | 5000µm
SKM 36 | Sick/Stegmann | Hiperface | Rotatory | 128Incr.
SKS 36 | Sick/Stegmann | Hiperface | Rotatory | 128Incr.
SRM 50 | Sick/Stegmann | Hiperface | Rotatory | 1024Incr.
SRM 60 | Sick/Stegmann | Hiperface | Rotatory | 1024Incr.
SRM 64 | Sick/Stegmann | Hiperface | Rotatory | 1024Incr.
SRS 50 | Sick/Stegmann | Hiperface | Rotatory | 1024Incr.
SRS 60 | Sick/Stegmann | Hiperface | Rotatory | 1024Incr.
SRS 64 | Sick/Stegmann | Hiperface | Rotatory | 1024Incr.
MOVITOOLS®-MotionStudio
OK
Cancel

2543866635

To select an encoder, highlight it and click on [OK].

[Non-SEW encoder] button

Click on the [Non-SEW encoder] button to define encoder types that are not included in the SEW database.

2544151691

You can define the encoder mounted to the motor using the following selection lists:

- Mechanical design
- Electrical design

Then press the [Load basic data] button. This command automatically sets the values in the fields "Number of periods/revolution" and "Denominator". You can also enter or change these values manually.

[Mounting] submenu

Enter the encoder counting direction and the speed ratio between the motor and encoder here.

2544359947

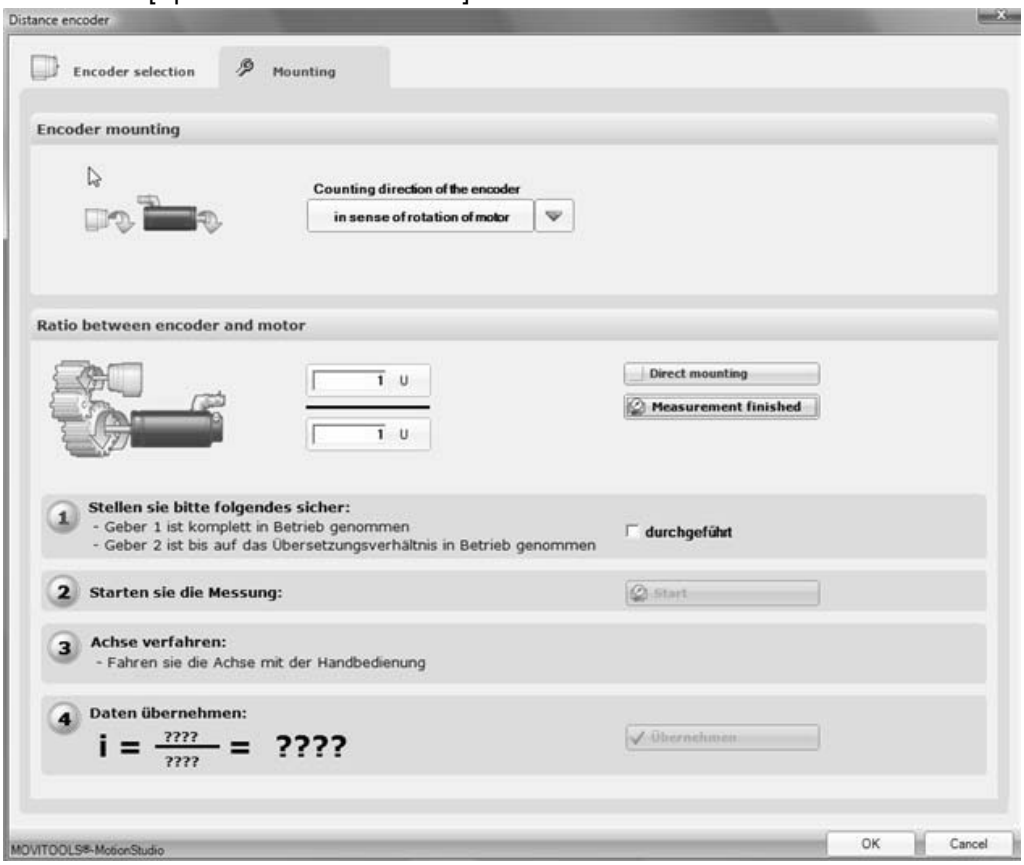
It is only necessary for encoders that are defined as distance encoders (encoders in the "Distance encoder" column) to adjust the encoder counting direction and the speed ratio between motor and encoder.

If the speed ratio is not known, it can be automatically determined in a "measurement run", see menu item "Speed ratio between motor and encoder" (page 154).

If the encoder is defined as "Motor encoder", it is not possible to enter data, as the encoder is mounted directly to the motor shaft, which means there is no speed ratio between encoder and motor. The counting direction is also pre-determined, it is always the direction of rotation of the motor.

[Speed ratio measurement] button

Click on the [Speed ratio measurement] button.



2544396939

Perform points 1 – 4 for the measurement. You can abort the measurement by clicking on [Abort measurement].

[Single-turn mode] button

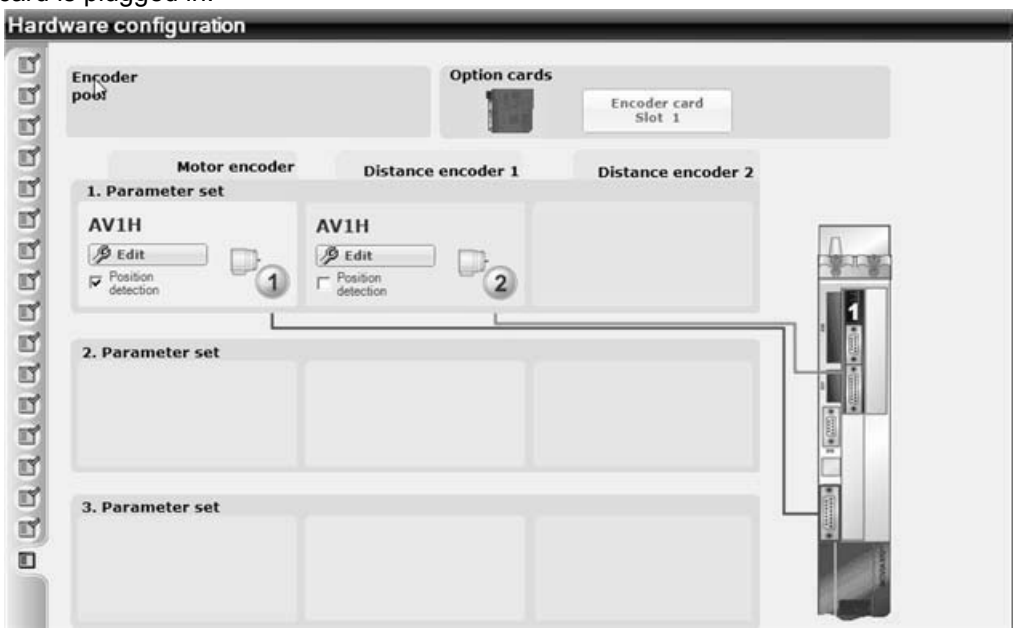
Click on the [Activate single-turn mode] button.

2544744715

Now, single-turn encoders such as EK0H or resolvers such as RH1M are considered like an absolute encoder for one encoder revolution.

5.9.8 Hardware configuration option cards

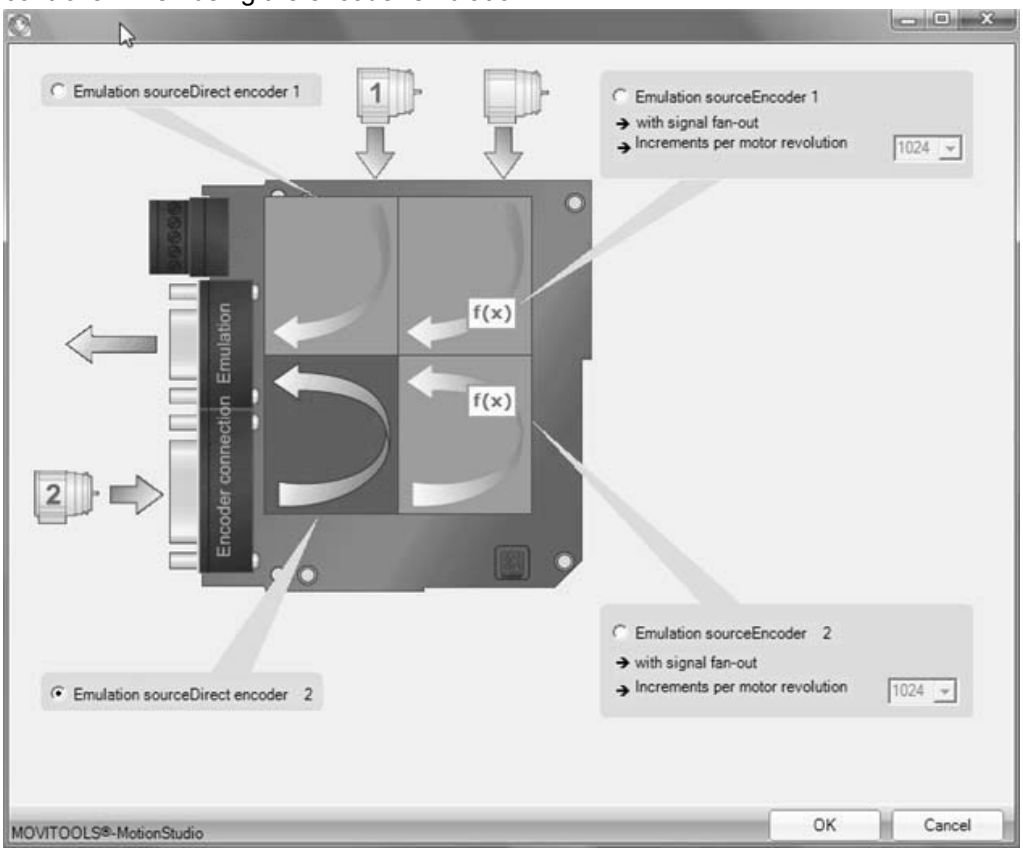
Click on the [Encoder card slot 1] or [Encoder card slot 2] button, if a second encoder card is plugged in.



2543454603

In the following submenu, the emulation sources and the encoder required for incremental encoder simulation are set.

Here, you can define how the encoder signals are to be conditioned for a higher-level controller when using the encoder emulation.



2544784779

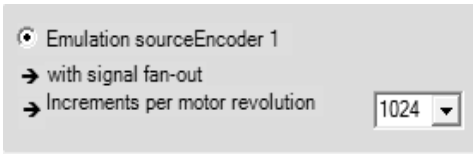
The following settings are available for conditioning the signal of the selected encoder.

- Emulation source direct encoder 1
- Emulation source direct encoder 2
- Emulation source encoder 1
  - With signal multiplication
  - Increments per motor revolution
- Emulation source encoder 2
  - With signal multiplication
  - Increments per motor revolution

In the above example, encoder 2 is selected as "Emulation source direct".

	INFORMATION
	The emulation signal generated by the option card is always an incremental signal, independent of the used encoder types (even when using sin/cos encoders), either with "Source direct" or "With signal multiplication".

	INFORMATION
	If a resolver is connected to the encoder input of the basic unit, it cannot be used as "Emulation source direct". This is possible in connection with software emulation only.



2544875787

When you select "Emulation source encoder 1 or 2", the following settings can be made in the "Increments per motor revolution" selection field:

64 / 128 / 256 / 512 / 1024 / 2048 / 4096.

The set PPR count or increments per motor revolution at the emulation output terminal are independent of the PPR count of the connected encoder type.

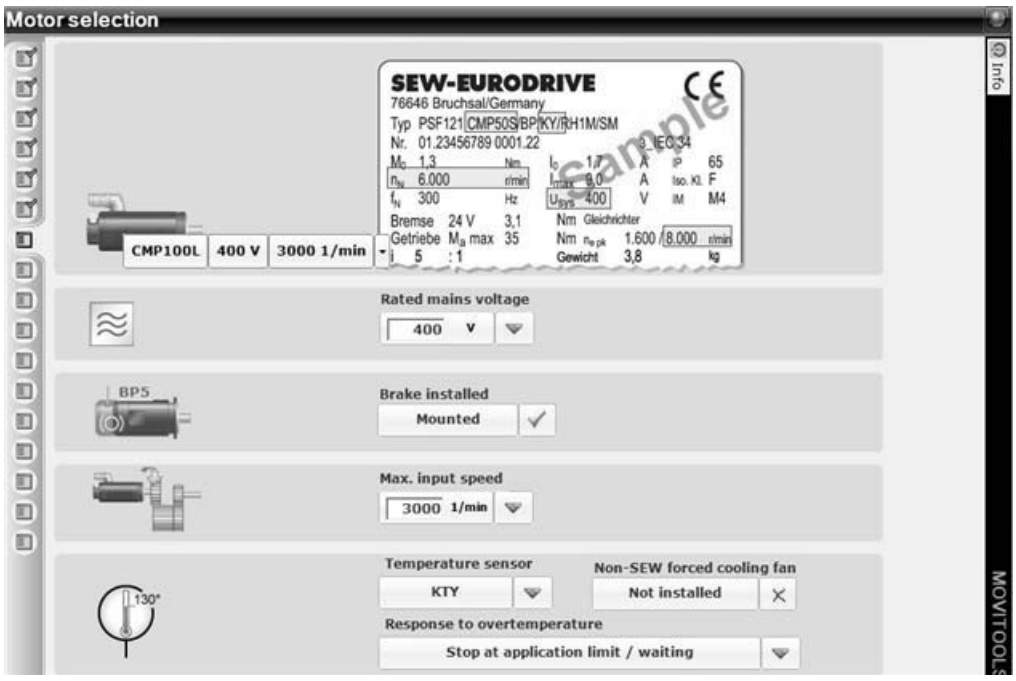
5.9.9 Motor type selection

In this menu, you can select the motor type that is to be operated on MOVIAXIS®. With motors from SEW-EURODRIVE, the motor type is listed on the nameplate.

2545113227

When starting up non-SEW motors, you need the technical data of the non-SEW motor. SEW-EURODRIVE can generate an XML file from this data. This file is then uploaded to MOVIAXIS® in the "Non-SEW motor" menu. Please contact SEW-EURODRIVE for this purpose.

5.9.10 Motor selection



2545115659

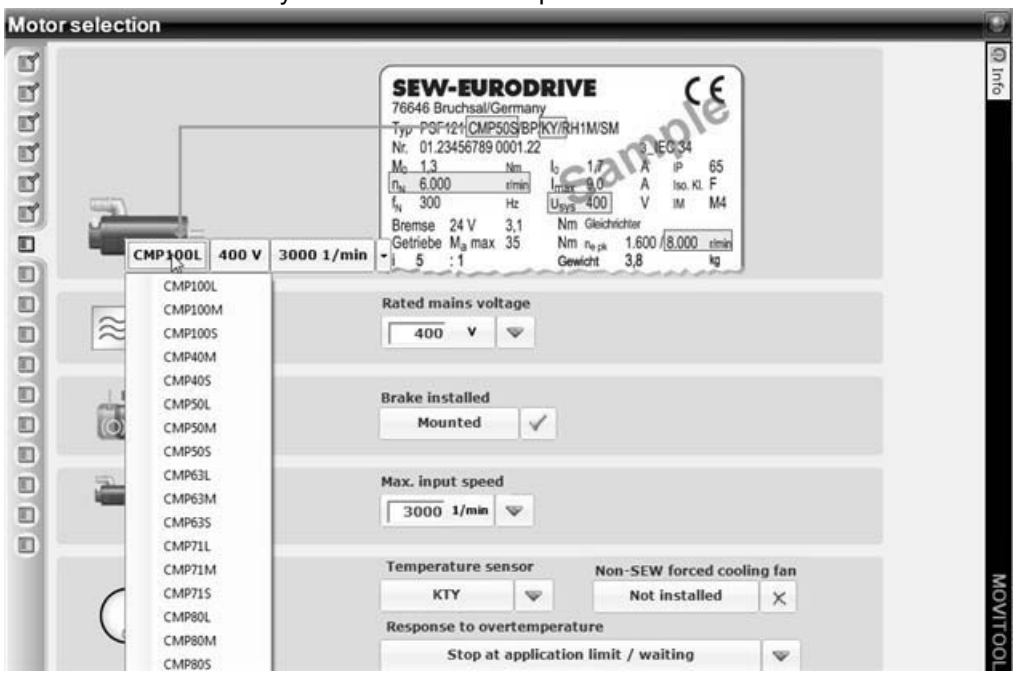
In the "Motor selection" menu, the motor data required for startup is set manually.

This data is listed on the nameplate of the motor and can be read from there. The motor connected to MOVIAXIS® is clearly identified when this data is entered.

	INFORMATION
	These settings can only be made if you have **not** selected "Load data permanently" in the [Electronic nameplate] menu.

Setting the motor data

If you move the mouse cursor over the nameplate in the menu, an arrow will show you where you have to enter this value in the menu. Clicking on the buttons opens a pull-down menu from which you can select the respective value.



2545179659

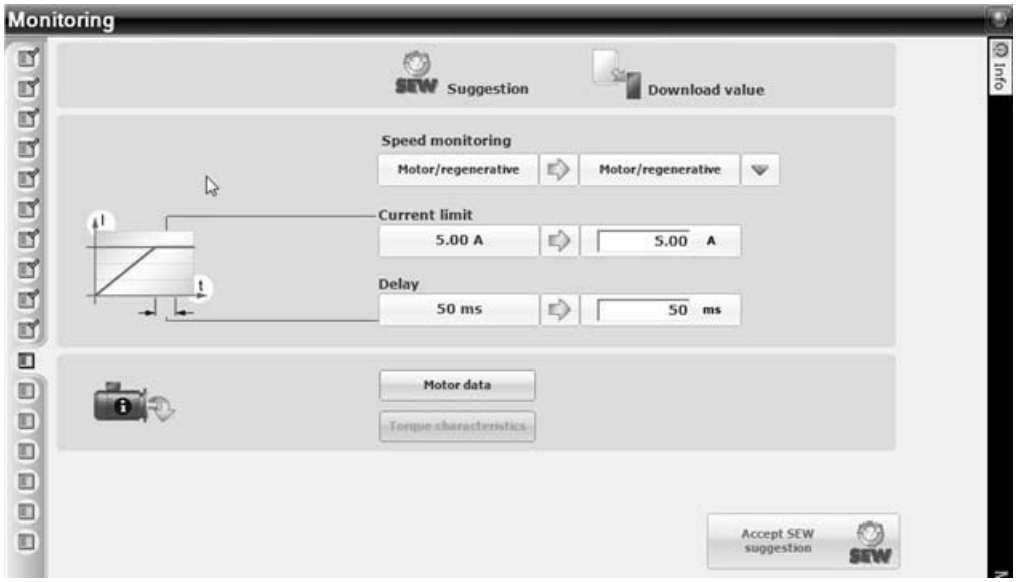
"Response to over-temperature" selection field

2545248139

The following switch-off responses for motor overtemperature are possible:

Input data	Description
Response to overtemperature	Here you can set the switch-off response of the MOVIAXIS® MX multi-axis servo inverter in case of a motor overtemperature. The following settings are available: • **No response** - Motor overtemperature is ignored. • **Display only** - the error is only displayed in the 7-segment display; the axis keeps on running. • **Output stage inhibit/pending** - The axis switches to FCB controller inhibit (motor coasts to a stop). The axis performs a "warm start" following a "reset" (see chapter "Operating Mode Display" in the operating instructions). The reset time is reduced to a minimum because there is no booting involved. • **Emergency stop/pending** - The axis decelerates along the emergency stop ramp. The axis performs a "warm start" following a "reset" (see chapter "Operating Mode Display" in the operating instructions). The reset time is reduced to a minimum because there is no booting involved. • **Stop at application limits/pending** - The axis decelerates using the application ramp. The axis performs a "warm start" following a "reset" (see chapter "Operating Mode Display" in the operating instructions). The reset time is reduced to a minimum because there is no booting involved. • **Stop at system limits/pending** - The axis decelerates using the system ramp. The axis performs a "warm start" following a "reset" (see chapter "Operating Mode Display" in the operating instructions or system manual). The reset time is reduced to a minimum because there is no booting involved.

5.9.11 Monitoring



2545250571

	INFORMATION
	The value in the left column of the input menu is a recommendation, while the value in the right column is the current value of the MOVIAXIS® MX multi-axis servo drive. Click on • "→" buttons to accept individual suggestions, • the "Accept" button to accept all suggestions in one step.

- Enter the general MOVIAXIS® MX control parameters according to the following table.

Input data	Description
Speed monitoring and deceleration time n-monitoring	The speed required by the setpoint can only be achieved if there is sufficient torque available to meet the load requirements. Once the current limit has been reached, the MOVIAXIS® MX multi-axis servo drive assumes that the torque has reached its maximum value. The desired speed cannot be attained. Speed monitoring is triggered if this situation continues throughout the duration of the specified **delay n-monitoring**.
Current limit	The current limitation refers to the apparent output current of the multi-axis servo drive.

5.9.12 Controller

In the [Controller] menu item, the data relevant for speed control is set.

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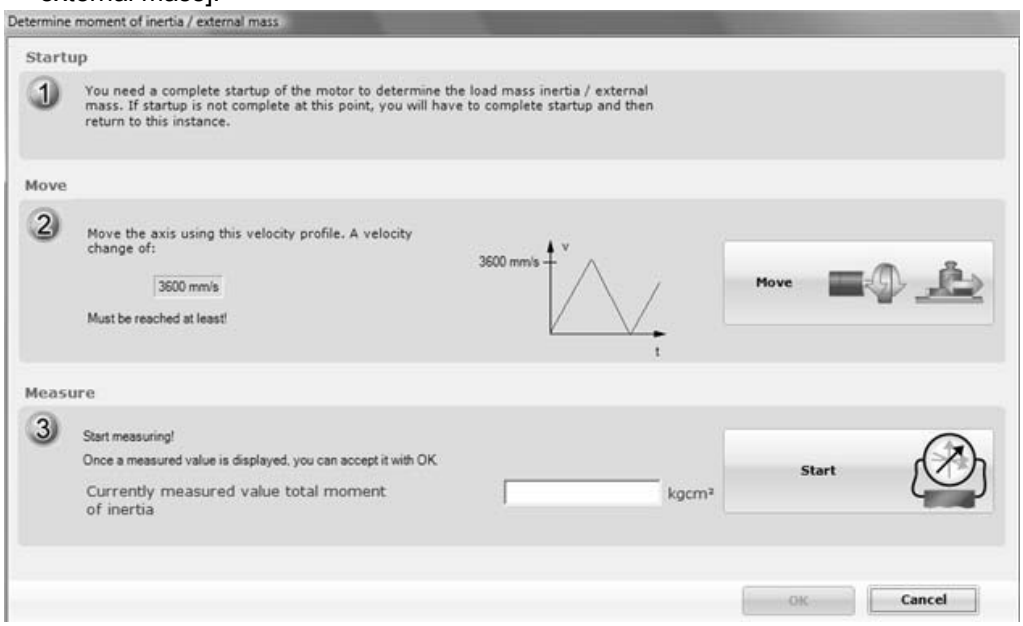
Moments of inertia

- **J motor**: Mass moment of inertia of the started up motor.
- **J load**: Mass moment of inertia of the load based on the motor shaft. If the mass moment of inertia of the load is not known, it can be determined automatically using [Measure], see [Measure] button (page 160).
- **J brake**: Mass moment of inertia of the motor brake.
- **Measure** (only possible after complete startup): If you do not know the external load inertia, you can perform a measurement run to determine it automatically. Click on [Measure] and follow the three points in the submenu [Determine moment of inertia/ external mass].


Determine moment of inertia / external mass
Startup
1
You need a complete startup of the motor to determine the load mass inertia / external mass. If startup is not complete at this point, you will have to complete startup and then return to this instance.
Move
2
Move the axis using this velocity profile. A velocity change of:
3600 mm/s
Must be reached at least!
3600 mm/s
v
t
Move
Measure
3
Start measuring!
Once a measured value is displayed, you can accept it with OK.
Currently measured value total moment of inertia
kgcm²
Start
OK
Cancel

2545453963

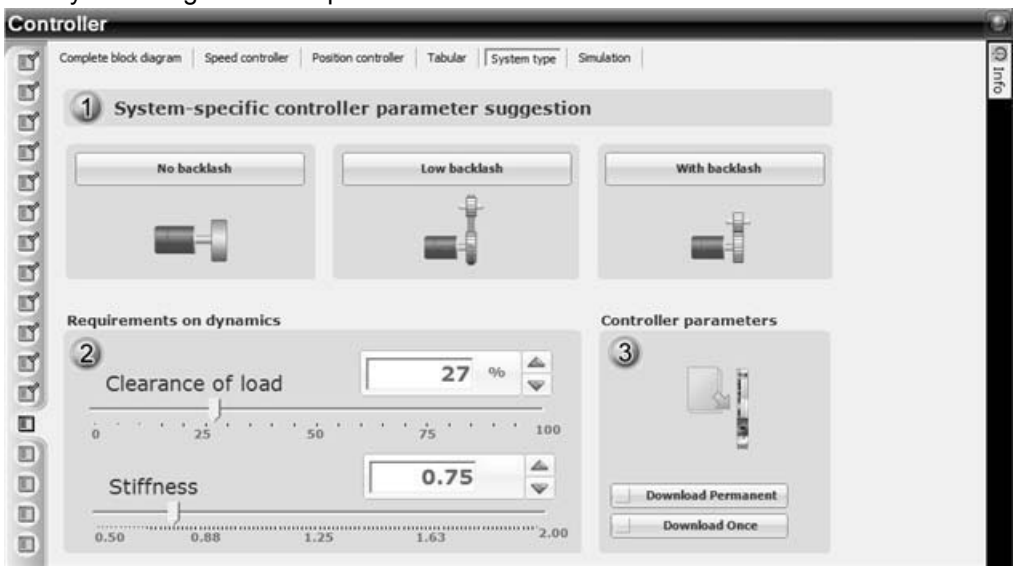
Time reference

- **Scanning frequency n/X control**: Use this field to specify the required scanning frequency of the speed or position controller. The default setting 1 ms should only be shortened for extremely dynamic applications.
- **Time interval external control**: Enter the time interval of the external controller. This value is required for all FCBs that generate a setpoint in an interpolated manner (external ramp generator) as well as for analog setpoint selection.

  Note: The input value is not relevant for internal setpoint selection, e.g. FCB09 Positioning.
- **PWM frequency**: Enter the **P**ulse**W**idth **M**odulation frequency here. The following can be entered: 4 kHz, 8 kHz (default setting), 16 kHz.

Controller optimization

- **SEW suggestion**: The control parameters preset by SEW can be accepted. Easiest way of setting all control parameters.



2545637003

- Referring to 1: System type selection (load coupling with the drive). Options: "No backlash" (e.g. directly coupled load), "Low backlash" (e.g. toothed belt coupling), "With backlash" (tooth/gear connection or gear rack coupling). In most cases, the basic settings can remain unchanged.
- Referring to 2: Use the sliders to set the backlash of the drive train. For fine-tuning the control parameters based on the backlash of the load coupling and the required control stiffness. Is only necessary if the basic setting under point 1 is not sufficient.
  - Use the "Clearance of load" slider to set the clearance of the drive train.
  - Use the "Stiffness" slider to set the stiffness of the speed controller. The value for the stiffness depends on the power transmission (direct drive high, toothed belt low) and is a measure for the velocity of the speed control loop. The value for the standard setting is 1.

    You enter the stiffness of the speed control loop either with the sliding scale or the input field.

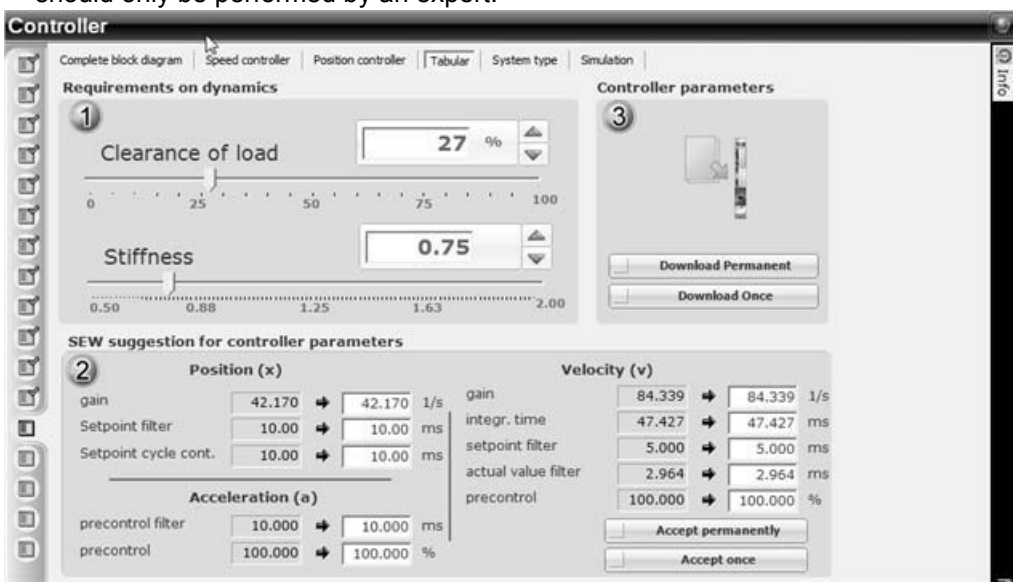
    If you increase the stiffness value, you will also increase the control rate. SEW-EURODRIVE recommends to increase the value during startup in small increments (0.05) until the control loop starts oscillating (motor noise). You will then have to lower the value. This approach ensures an optimum setting.
- Referring to 3: For fine-tuning during the test run.

  [Download once] button: The control parameters are only downloaded once.

  [Download permanent] button: The control parameters are downloaded each time the load backlash or the stiffness change. Indicated by a green progress bar.

Note: When selecting [Download once] or [Download permanent], all parameters listed in the [Controller] menus are downloaded.

- **Tabular**: The control parameters preset by SEW-EURODRIVE can be accepted or optimized. Direct adjustment or optimization of the individual control parameters should only be performed by an expert.



2546150155

- Referring to 1: Settings made with the sliders "Clearance of load" and "Stiffness" only affect the suggested values. If you want to accept the suggested values, click on the [Download permanent] or [Download once] button. Only now, your entries have become active.
- Referring to 2:

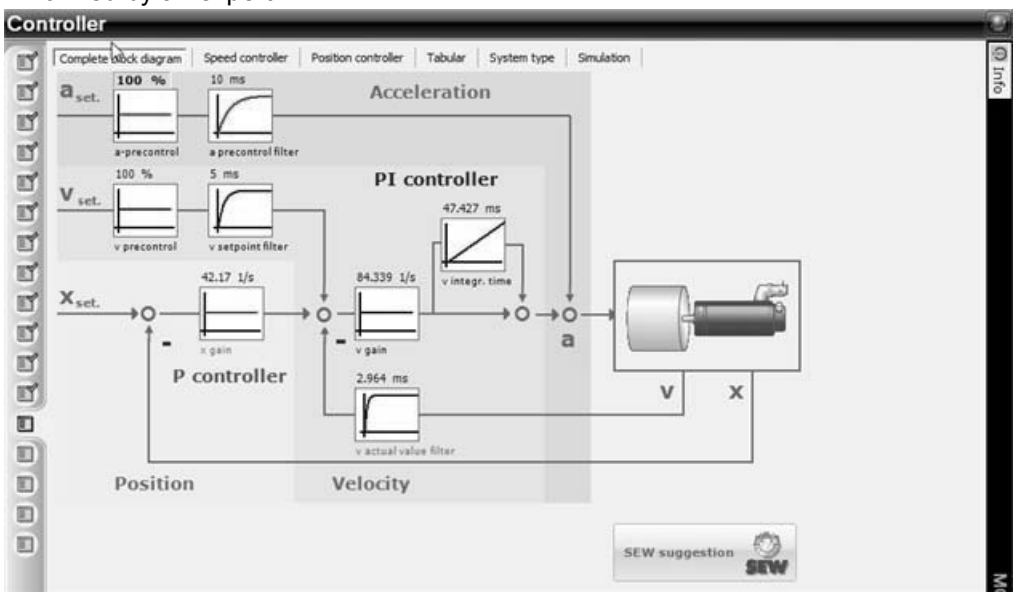
Input data	Description
Position (x)	
Gain	Setting value for the P controller of the position control loop.
Setpoint filter	Setpoint value is filtered, stepped setpoints can be smoothed.
Setpoint cycle cont.	Time interval of external controller.
Velocity (v)	
Gain	Gain factor of the P-component.
Integrative time	Integration time constant of the speed controller. The I-component reacts inversely proportionate to the time constant, i.e. a large numerical value results in a small I-component, although 0 = no I-component.
Setpoint filter	Speed setpoint is filtered, graduated setpoint entry or interfering impulses at analog input can be smoothed.
Actual value filter	Filter time constant of the actual speed value filter.
Precontrol	Gain factor of the P-component of the speed controller.
Acceleration (a)	
Precontrol filter	Filter time constant of acceleration precontrol.
Precontrol	Amplification factor of acceleration precontrol. It improves the control response of the speed controller.

- Referring to 3: For fine-tuning during the test run.

  [Download permanent] button: The control parameters are downloaded each time the load backlash or the stiffness change. Indicated by a green progress bar.

  [Download once] button: The control parameters are downloaded only once.

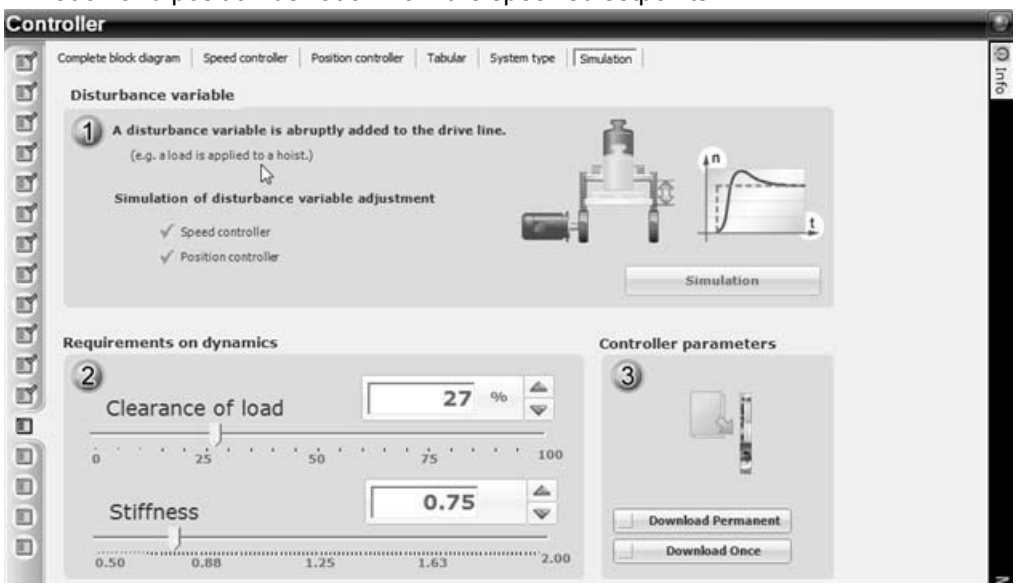
- **Structural diagram**: In the [Complete block diagram] submenu, you can set all parameters relevant for control (speed control, position control, acceleration). Direct adjustment or optimization of the individual control parameters should only be performed by an expert.



2546306187

The control symbols with a gray background in the submenus "Speed controller" and "Position controller" are not active.

- **Simulation**: Here, a virtual load shock (torque step change of the load) from 0 Nm to M_0 (standstill torque of the motor) is used to simulate the extent of the speed deviation and position deviation from the specified setpoints.



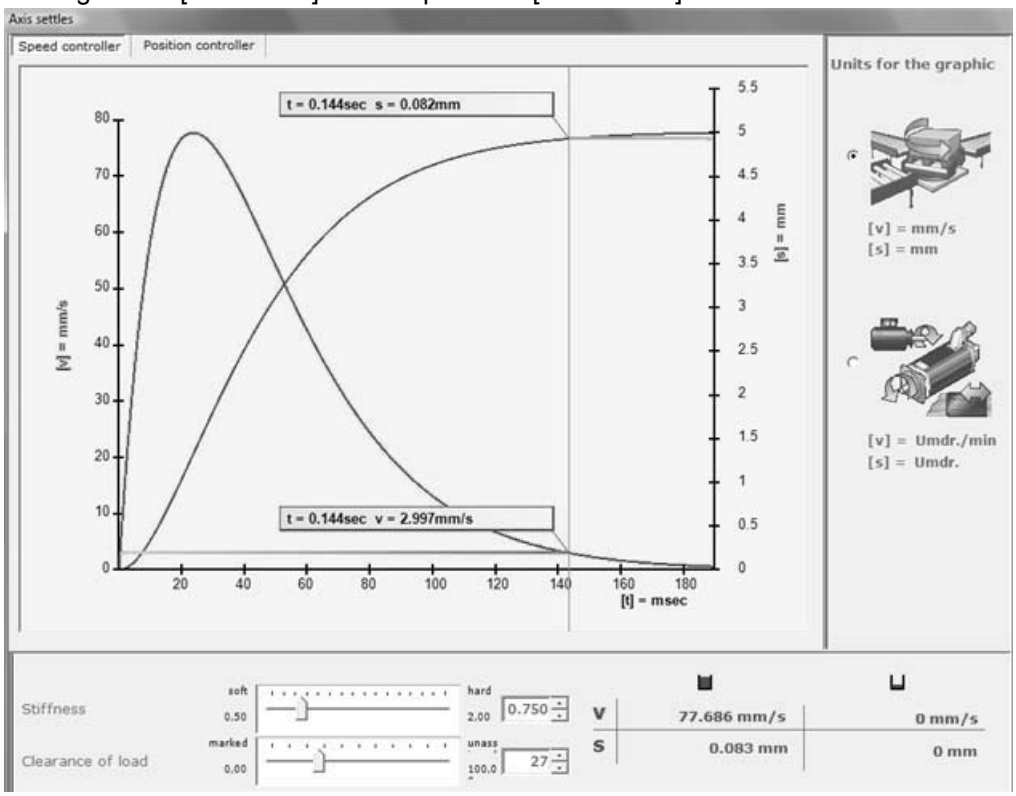
2546384907

- Referring to 2: For fine-tuning the control parameters based on the backlash of the load coupling and the required control stiffness, see section "Controller optimization" (page 162).
- Referring to 3: For fine-tuning during the test run.

  [Download permanent] button: The control parameters are downloaded each time the load backlash or the stiffness change. Indicated by a green progress bar.

  [Download once] button: The control parameters are downloaded only once.

Clicking on the [Simulation] button opens the [Axis settles] submenu.



2546899083

Depending on whether you select the [Speed controller] or [Position controller] tab, you can read off the speed or position deviation against time. Use the mouse to move the green line across the time axis.

You can choose system or user-defined units for the illustration.

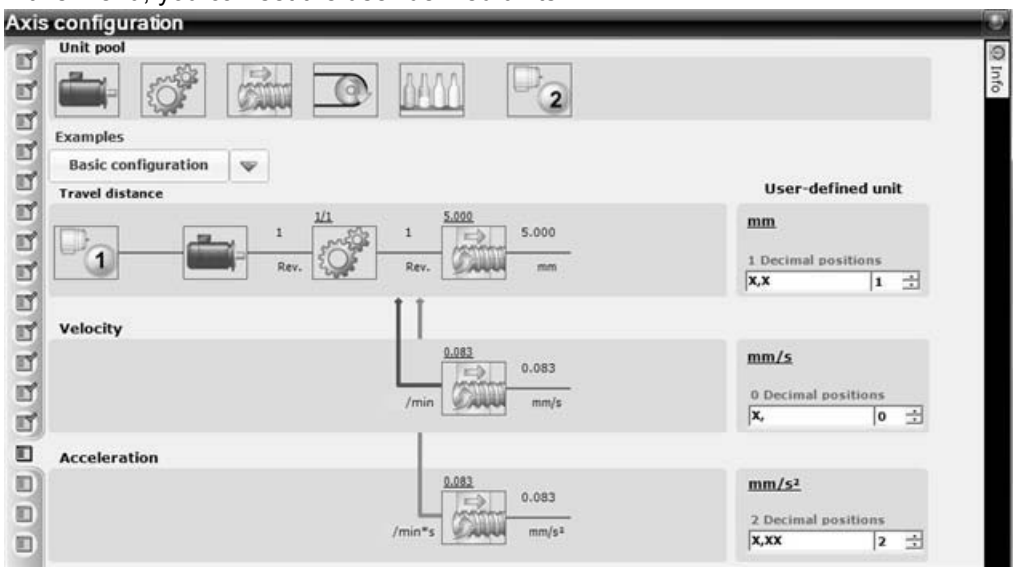
Here, too, you can use the sliders for fine-tuning the control parameters based on the backlash of the load coupling and the required control stiffness.

The maximum and minimum speed and position deviation is listed in the table in the bottom right corner of the menu.

2548223755

5.9.13 Axis configuration

In this menu, you can set the user-defined units.



2548226443

MOVIAXIS® offers four user-defined units for the following variables:

- Travel distance,
- Velocity,
- Acceleration,
- Torque (not in motor startup → parameter tree).

A numerator, denominator and the decimal places for each variable are loaded to the axis module. The decimal places are only needed for display in the MotionStudio. They are neither used for converting user-defined units nor for bus communication.

[Basic configuration] button

- Distance

  Unit: Rotations (of the motor), 4 decimal positions

Example:

Setpoint	Traveled distance	Display in MotionStudio
10000	1 motor revolution	1.0000
15000	1.5 motor revolutions	1.5000

Once motor startup has been executed, the following values are written to the axis module (conversion 16-bit increments/revolution):

- User-defined unit of position numerator = 4096
- User-defined unit of position denominator = 625
- User-defined unit of position resolution = 10^{-4}

- Velocity

  Unit: rpm, no decimal places

Example:

Setpoint	Velocity	Display in MotionStudio
1000000	1000 rpm	1000
2345000	2345 rpm	2345

Once motor startup has been executed, the following values are written to the axis module:

- User-defined unit of velocity numerator = 1000
- User-defined unit of velocity denominator = 1
- User-defined unit of velocity resolution = 1

- Acceleration

  Unit: 1/(min × s) speed change per second, no decimal places

Example:

Setpoint	Acceleration	Display in MotionStudio
6500000	65000 1/(min × s)	65000
300000	3000 1/(min × s)	3000

Once motor startup has been executed, the following values are written to the axis module:

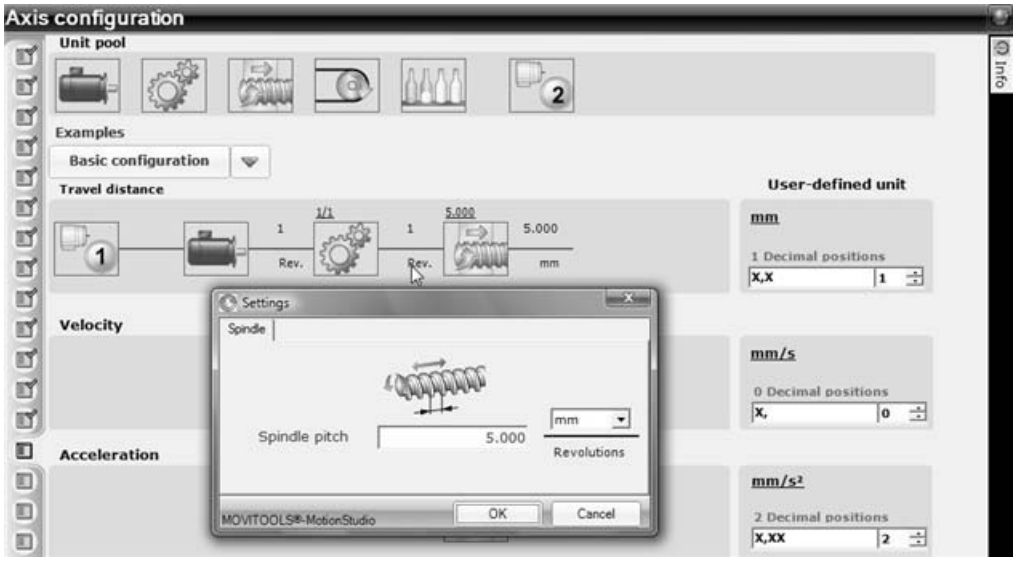
- User-defined unit of acceleration numerator = 100
- User-defined unit of acceleration denominator = 1
- User-defined unit of acceleration resolution = 1

Example

Spindle application – a rotary movement is converted into a linear movement.

Specification of user-defined units:

- Position in mm with one decimal place (e.g. 25.6 mm)
- Velocity in mm/s with no decimal place (e.g. 5 mm/s)
- Acceleration in mm/s^2 with two decimal places (e.g. 10 mm/s^2)



2548231819

Procedure:

Position

- Use the mouse to drag the spindle icon from the unit pool to the drive train in the "Travel distance" row.
- Set the user-defined units in the "Travel distance" row to 1 decimal place.
- Click on the spindle icon. In the [Settings] window that opens now, you can enter the spindle pitch.

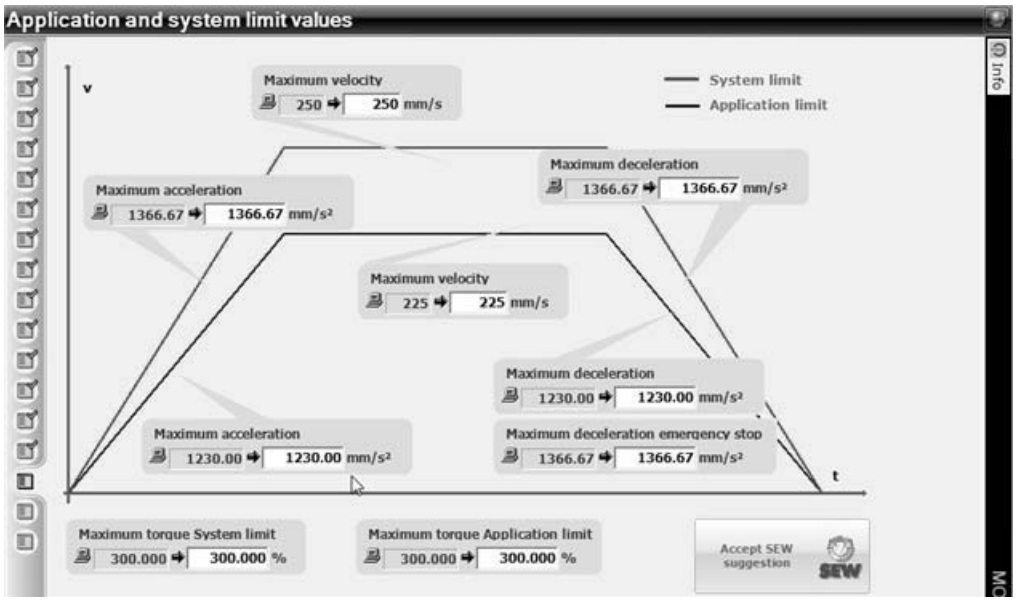
Velocity

- Use the mouse to drag the spindle icon from the unit pool to the drive train in the "Velocity" row.
- Set the user-defined units in the "Velocity" row to no decimal places.

Acceleration

- Use the mouse to drag the spindle icon from the unit pool to the drive train in the "Acceleration" row.
- Set the user-defined units in the "Acceleration" row to 2 decimal places.

5.9.14 Application and system limit values



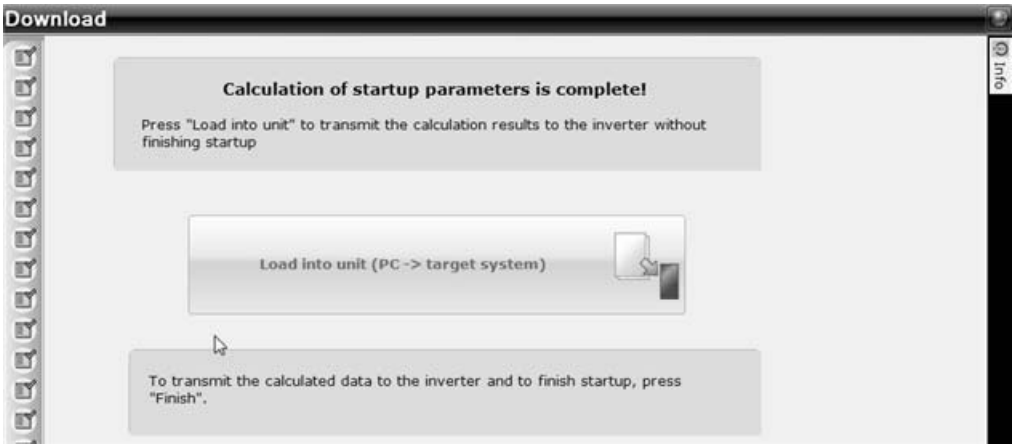
2548418699

The application and machine limit values refer to the set user-defined units. The user-specified units selected previously are shown in the illustration and cannot be altered.

The fields on the right refer to the download value in the axis, converted to the user-specified unit. The fields on the left are calculated suggestions of the program.

Click on the "Accept SEW suggestion" to use the suggested values.

5.9.15 Download


Download
Info
Calculation of startup parameters is complete!
Press "Load into unit" to transmit the calculation results to the inverter without finishing startup
Load into unit (PC -> target system)
To transmit the calculated data to the inverter and to finish startup, press "Finish".

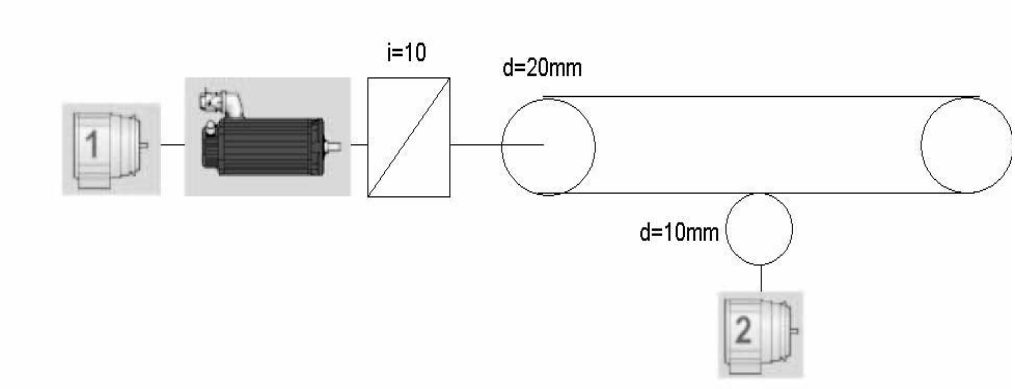
2548421131

5.10 Application examples

5.10.1 Example 1: Rotary encoder as distance encoder

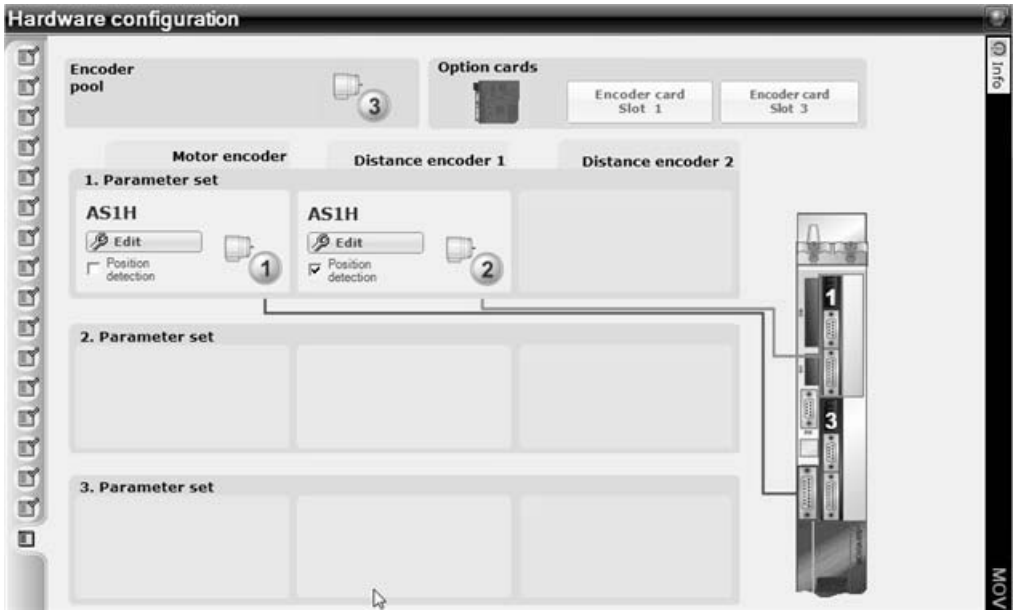
Areas of application: E.g. non-linear transmission elements, such as crank arms, flying saws, master value axes, such as electronic cams.

In this example, the position actual value of the absolute encoder designated as encoder 2 is used directly for position control. The encoder ratio between the motor encoder (encoder 1) and distance encoder (encoder 2) must be set during startup. In this example, the encoder ratio between encoder 1 and encoder 2 is "1:5". The encoder ratio between encoder 1 and encoder 2 is determined automatically by running the drives in the system. It can also be calculated and entered manually.

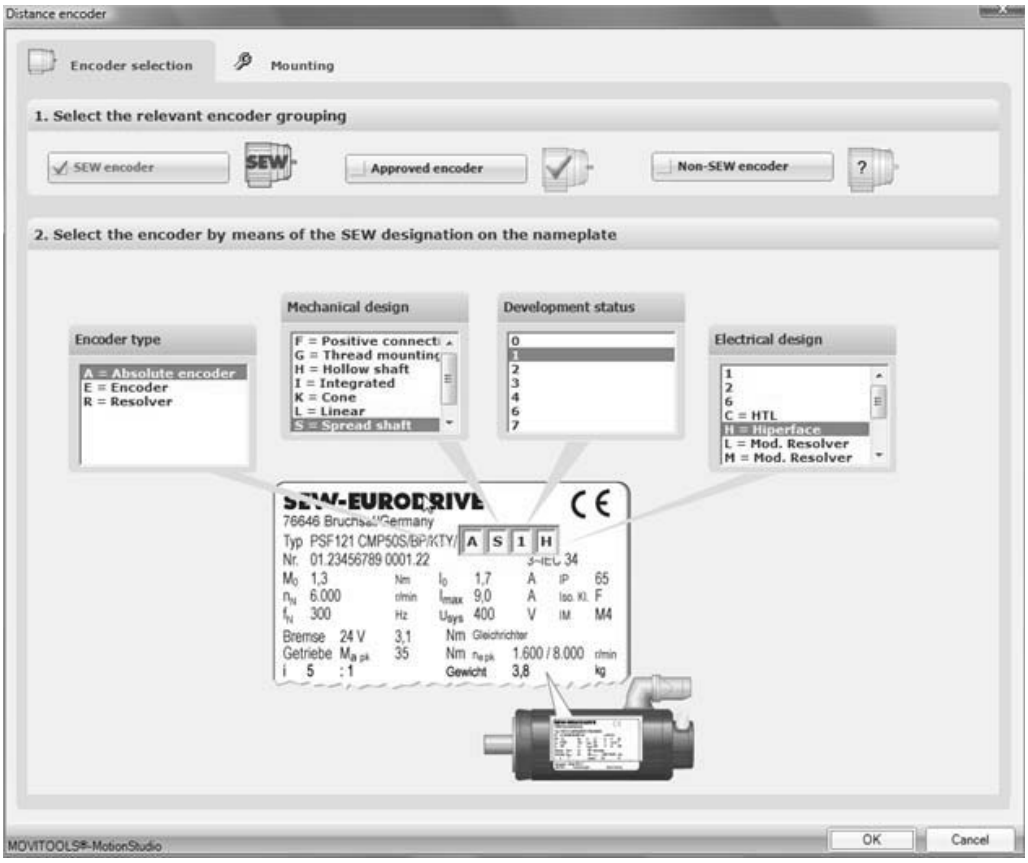


1409350283

Settings:



2553344907

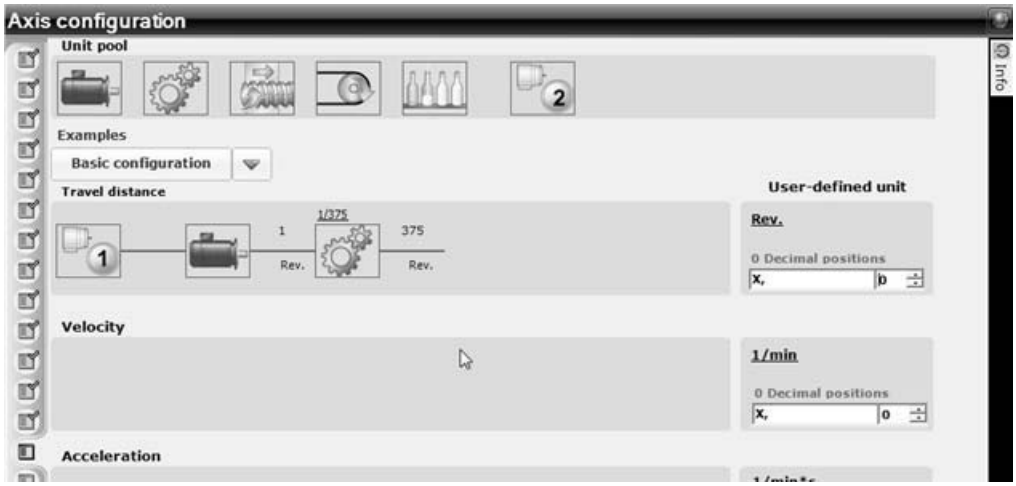


2553348107

Selection and settings of the encoder type.

2557571595

Setting the ratio between encoder revolutions and motor revolutions directly, i.e. after calculation or by running the system.

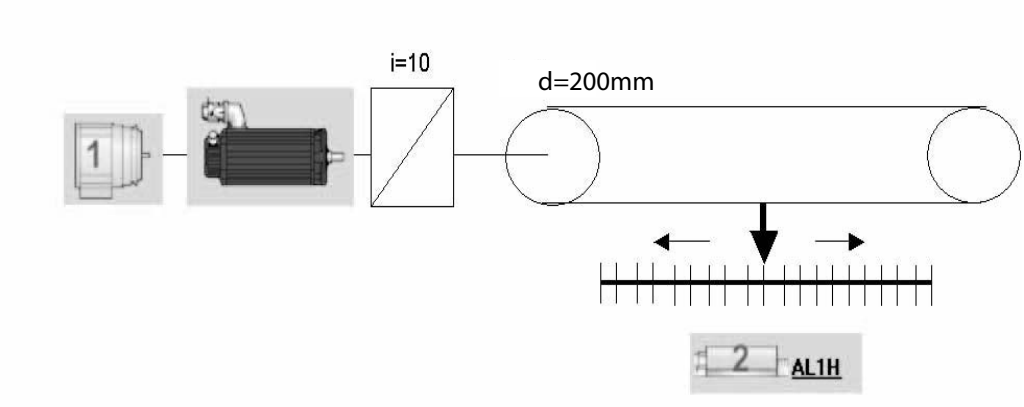


For rotary encoders, the ratio between encoder and motor revolutions cannot be determined or entered in the [Axis configuration] menu. This is only possible in the [Encoder selection] menu, submenu [Mounting], see chapter "Hardware configuration encoder pool" (page 149).

5.10.2 Example 2: Linear encoder as position encoder

Areas of application for such a setup are, for example, storage and retrieval systems (due to the slip of the carrying wheels) and systems with backlash.

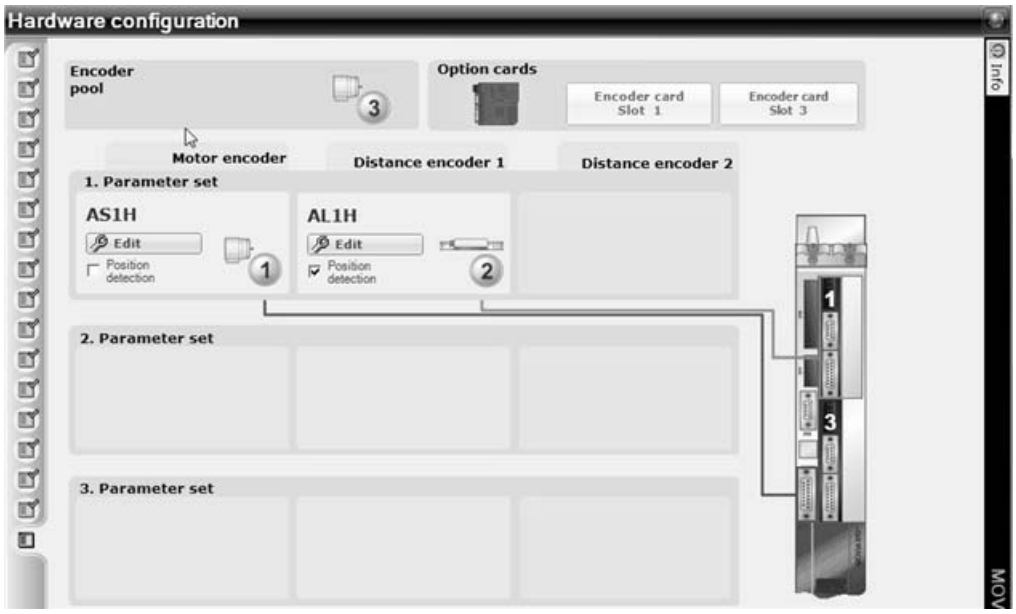
The travel distance of the linear distance encoder must be entered for one motor revolution. The travel distance for one motor revolution is determined automatically, but it can also be calculated and entered manually.



1409436811

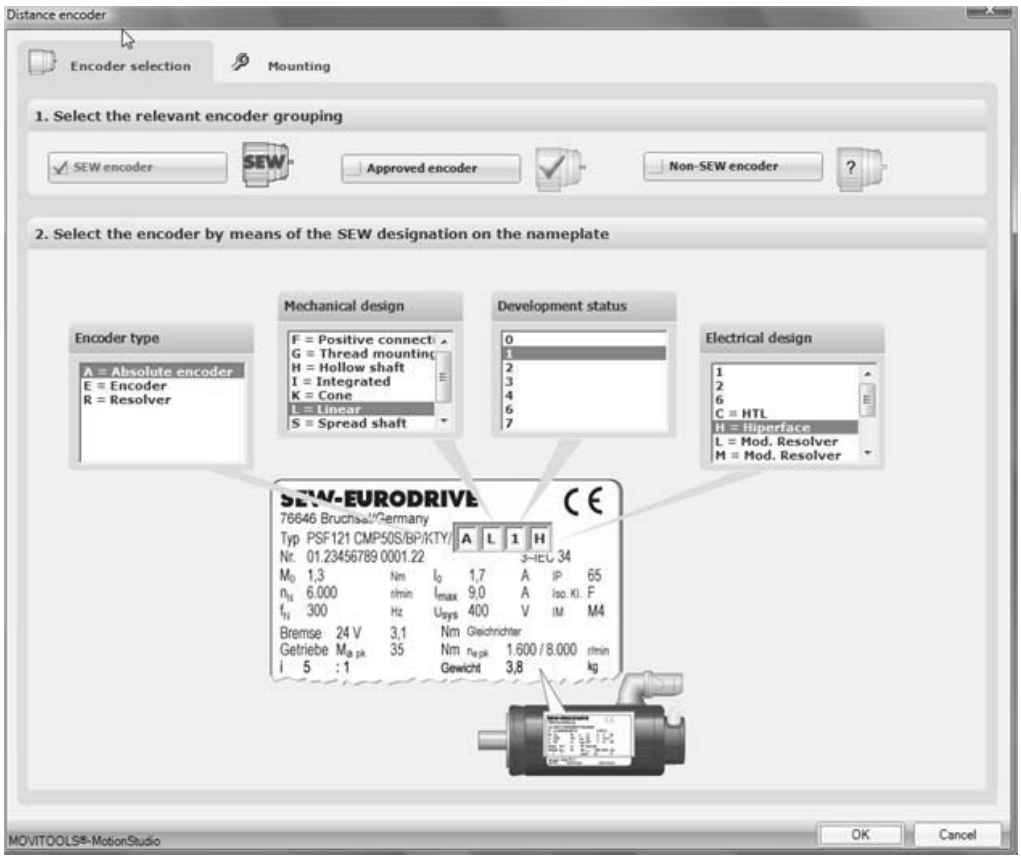
Settings:

Selection and settings of the used encoder type using the example of the AL1H linear encoder.



2557574539

Encoder 2 must be set up for position detection.

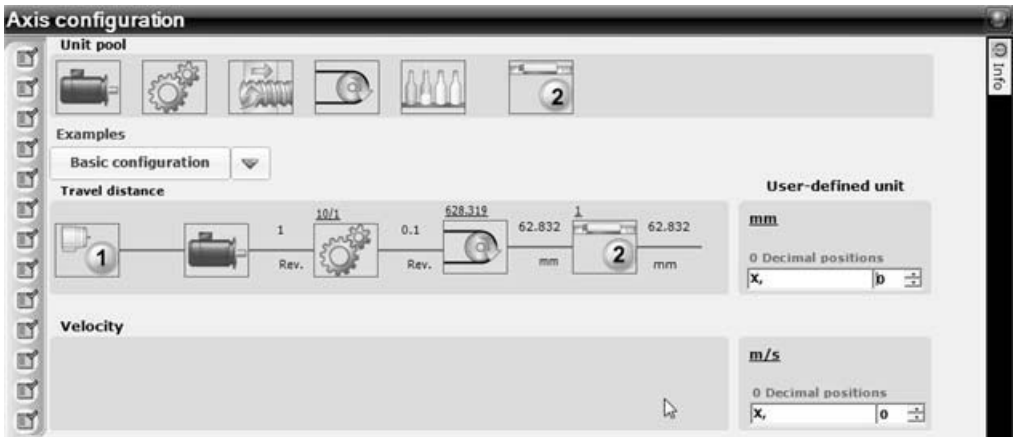


2557576971

Selection and settings of the used AL1H encoder.

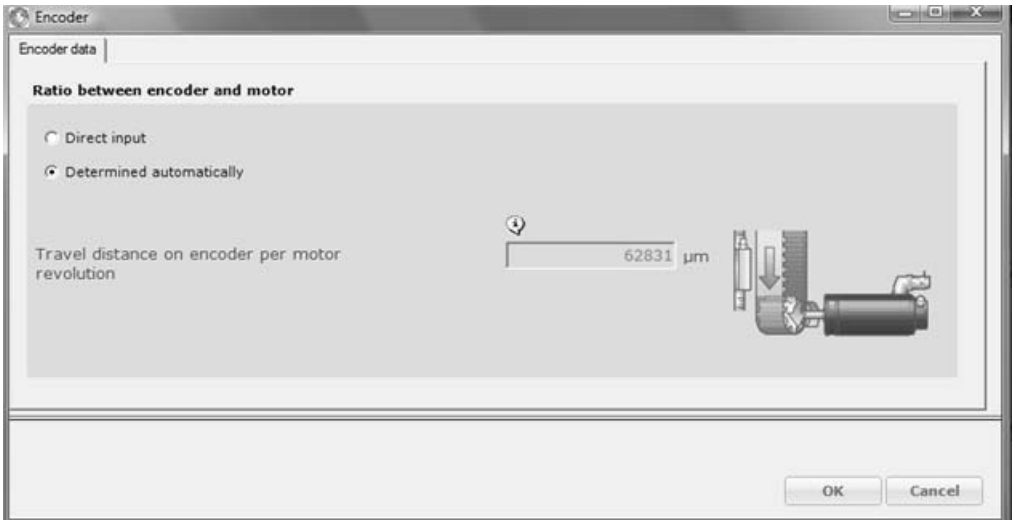
Determining the ratio between motor and encoder.

In the [Axis configuration] menu, the required user-defined units are set and the drive train is emulated. For the emulation of the drive train, select the required icons in the [Unit pool] menu and drag them to the "Travel distance" row.



Selection and settings of the used AL1H encoder.

Configuration of the axis.



2557633803

Click on the "Encoder 2 AL1H" icon to enter the "Travel distance on encoder per motor revolution". It is possible to enter the travel distance directly after calculating it manually, or to determine it by moving the system or by selecting "Automatic detection". In this example, the "Travel distance on the encoder per motor revolution" is 62831 µm.

5.11 MOVIAXIS® startup – multi-motor operation

	INFORMATION
	In this section, the startup menus are described which require special settings for multi-motor operation. The overall startup is performed as described in chapter "MOVIAXIS® startup - single-motor operation" (page 143).

Multi-motor operation requires one or two multi-encoder cards, depending on the number of motors that are to be operated.

Multi-encoder cards expand the MOVIAXIS® system for evaluation of additional encoders. Two different multi-encoder cards are available. They have to be selected according to the encoder that is to be evaluated.

5.11.1 Areas of application

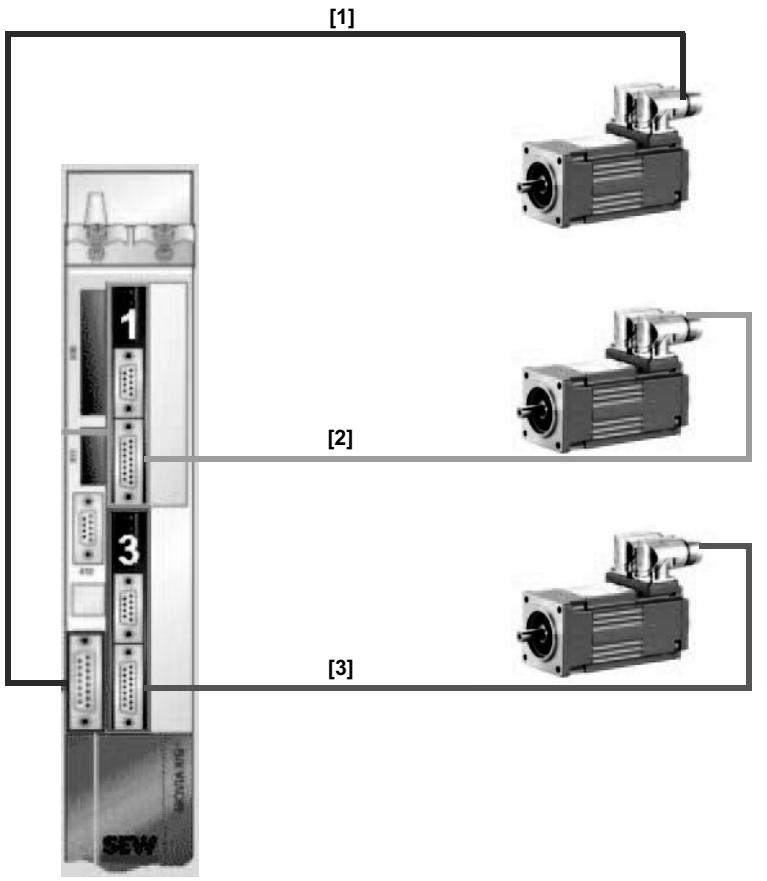
The multi-encoder card can be used for the following areas of application:

- Positioning either directly with the external encoder or with the motor encoder
- Multi-motor operation (max. 3 motors)
- SSI absolute encoder evaluation
- Operation of non-SEW motors that are equipped with EnDat encoders
- Systems with slip
- Compensation of rope and belt elongation
- Reading in the master value of cams and synchronous operation systems
- Analog setpoint specification and incremental encoder simulation of the actual position to the controller
- General use of the differential analog input ±10 V, e.g. for specifying speed or torque setpoints.

5.11.2 Example: Multi-motor operation

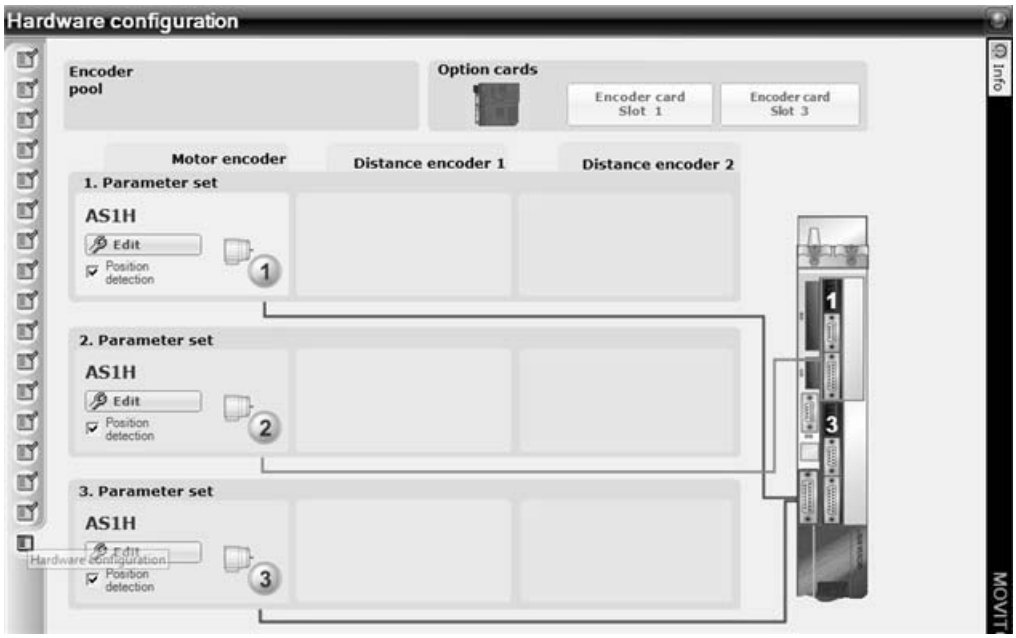
Application: In applications with several axes, which have the same output torque and which are **not** operated at the same time.

Up to 3 motors can be connected to one axis module For this purpose, 2 additional multi-encoder cards must be plugged into the axis module, see following figure. Depending on the activated parameter set, power must be connected to the individual motors via power contactors.



2557636363

[1] Motor encoder 1 to basic unit
[2] Motor encoder 2, multi-encoder card 1, slot 1
[3] Motor encoder 3, multi-encoder card 2, slot 3



2557639307

For encoder 1, set "Position detection" for parameter set 1

For encoder 2, set "Position detection" for parameter set 2

For encoder 3, set "Position detection" for parameter set 3

The individual parameter sets can only be started up one after another, and only after the complete startup procedure has been performed.

The individual parameter sets can be selected via parameters, please refer to the parameter description in the "MOVIAXIS® Multi-Axis Servo Inverter" system manual.

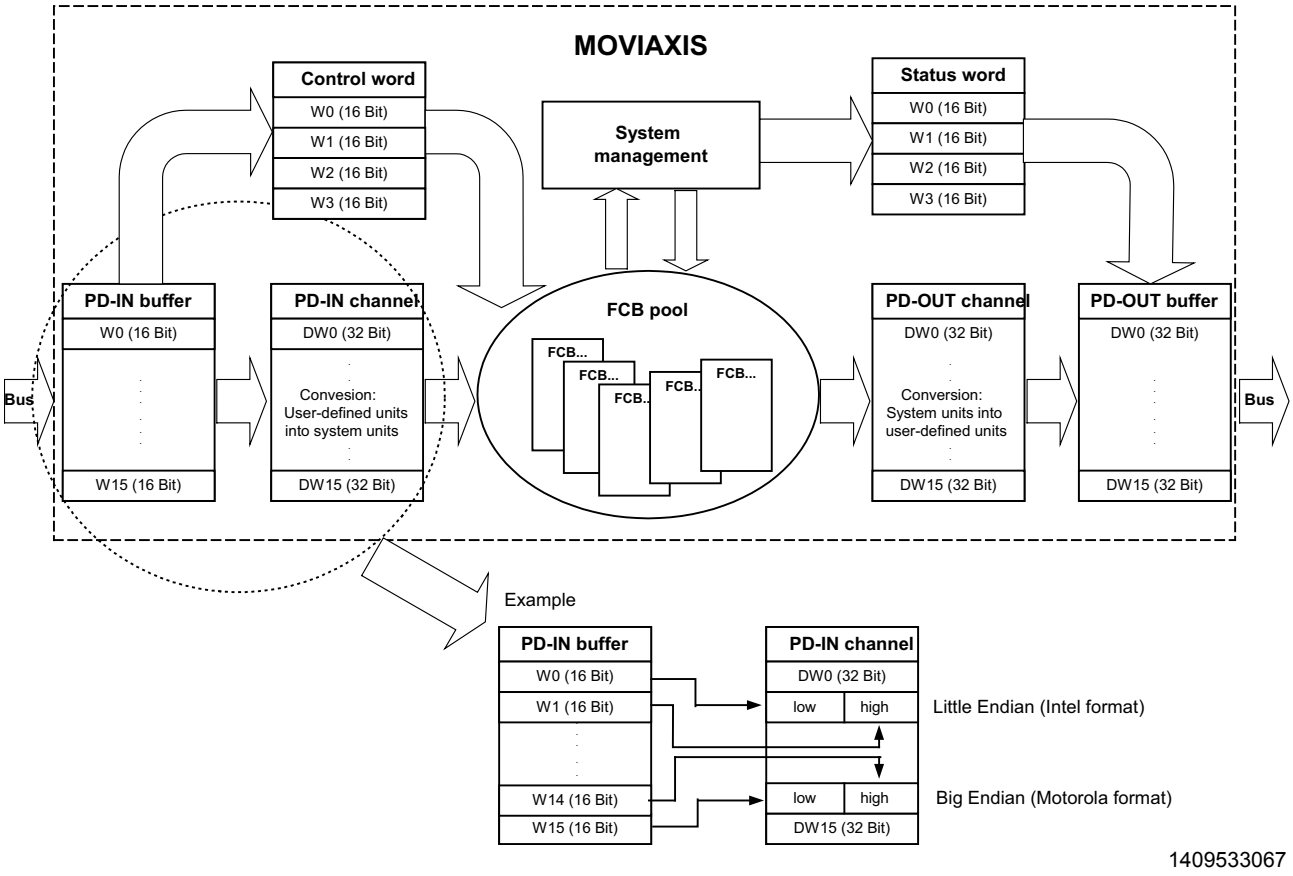
5.12 PDO Editor

Use the PDO Editor to set the process data.

5.12.1 Structure and data flow

You can write setpoints, such as velocity or position, as 16-bit process data into the PD-IN buffer of MOVIAXIS® via a bus system, e.g. a fieldbus. You can specify these setpoints in freely definable user-specific units, e.g.

- [m/s]
- [mm]
- [cycles/min].



1409533067

These process data are further processed as double word depending on how the subsequent PD-IN channel is configured. The user-defined units are converted into system units and transferred to the relevant FCBs. MOVIAXIS® offers 16 PD-IN channels.

Depending on the process data configuration, actual values such as speed and position can be converted into user-specified units via sixteen 32-bit wide PD-OUT channels and are transferred to the connected bus system via 16 process data buffers.

Information on the status of the axis, such as

- Ready
- Motor standstill
- Brake released

can also be written to a process data word of the PD-OUT buffer via a status word. The information can also be processed by a higher-level controller via the connected bus.

Four configurable status words are available (page 179).

5.12.2 Parameter setting example

This example shows how to set the parameters of a PROFIBUS connection for speed control.

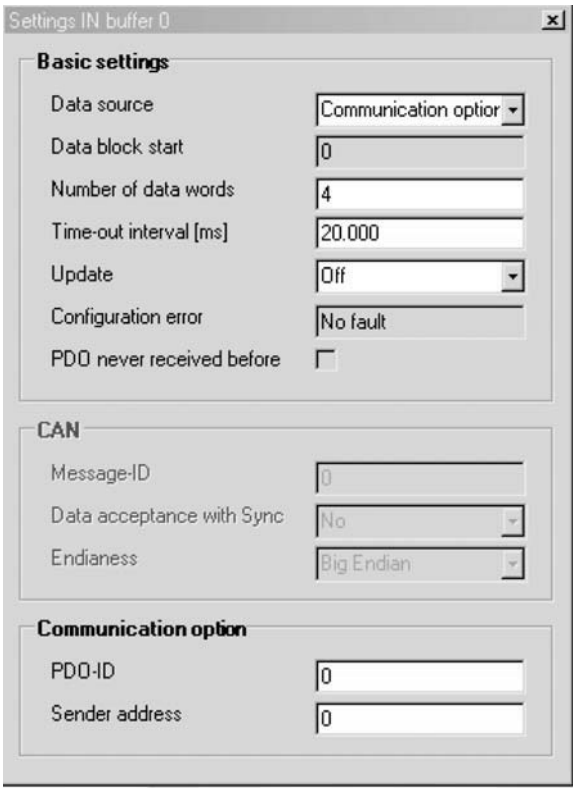
Setting the fieldbus interface parameters

A mouse-click on an IN buffer opens its configuration interface. The communication option is selected as data source for a PROFIBUS connection.

The following three process data words are used in the example:

- FCB activation
- Ramp
- Speed.

To being able to test the example without PROFIBUS, the update function is first set to off. The configuration interface for these settings looks as follows:



1409535499

Setting the parameters of the control word and the IN process data

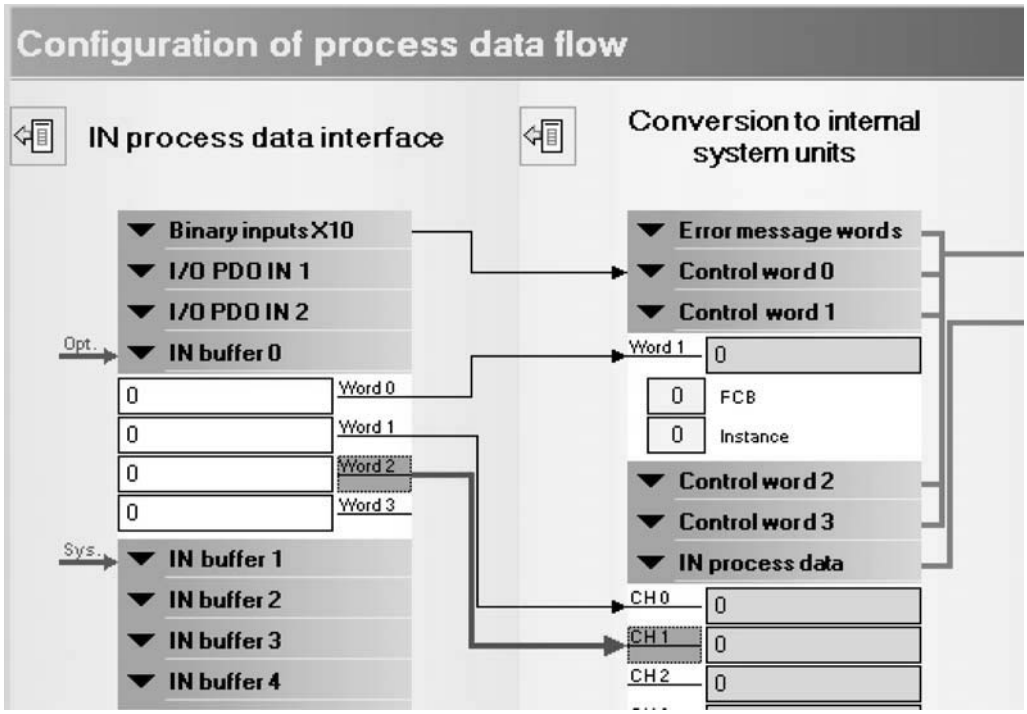
A single click on one of the control words, in the example control word1, opens the configuration interface and selects the FCB/instance layout. The IN process data channel 0 is assigned the system variable "Velocity", and channel 1 is assigned the system variable "Acceleration".

1409709451

Assigning the input buffer to the system variables

Next, the words of the IN buffer must be assigned to the control word 1 and the IN process data.

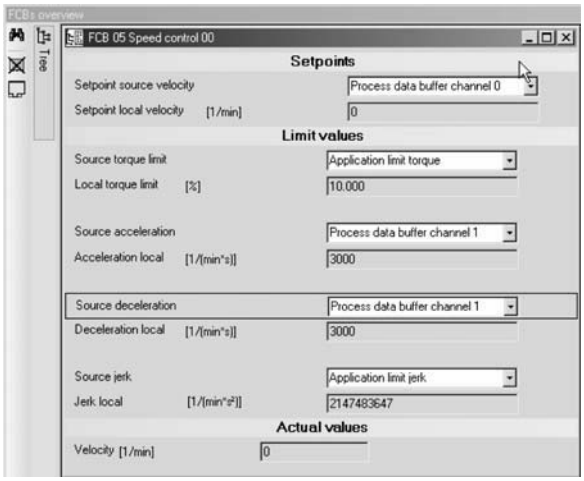
In the example, the first word of the IN buffer is assigned the FCB number, the second word is assigned the speed, and the third word the ramp. You can assign the respective words using drag & drop.



1409711883

Setting the FCB parameters

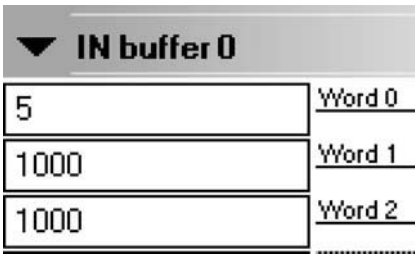
Clicking "FCB" opens the parameterization interface of the FCBs. To being able to control the speed controller via fieldbus, the setpoint sources for velocity and acceleration values are set to process data buffer channel 0 or channel 1 in the FCB05.



1409714315

Testing the configurations

The configuration is now complete and can be tested. You can change the words in the detail view using the keyboard as long as the IN buffer update is disabled.



1409716747

The words are automatically updated with the values of the bus as soon as the update function is activated (page 180).

	INFORMATION
	The update function is automatically enabled when the servo inverter is restarted and has to be disabled, if required.

5.13 Parameter list

For a parameter list with descriptions, refer to the "MOVIAXIS® Multi-Axis Servo Inverter" system manual and on the Internet as a PDF file ("Parameter description of MOVIAXIS® multi-axis servo inverter").

6 Operation

6.1 General information

⚠ DANGER

Dangerous voltages at cables and motor terminals

Severe or fatal injuries from electric shock.

- When the unit switch is in the ON position, dangerous voltages are present at the output terminals as well as any connected cables and motor terminals. This also applies even when the unit is inhibited and the motor is at standstill.
- The fact that the operation LED is no longer illuminated does not indicate that the MOVIAXIS® multi-axis servo drive is no longer connected to the supply system and is de-energized.
- Before you touch the power terminals, check to see that the MOVIAXIS® multi-axis servo drive has been disconnected from the supply system.
- Observe the general safety notes in chapter 2 (page 8) and the notes in chapter "Electrical Installation" (page 60).

⚠ DANGER

Risk of crushing if the motor starts up unintentionally.

Severe or fatal injuries.

Mechanical blocking or internal safety functions of the unit can cause a motor standstill. Eliminating the cause of the problem or performing a reset may result in the drive restarting automatically.

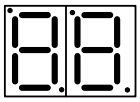
- Ensure that the motor cannot start inadvertently, for example, by removing the electronics terminal block X10.
- Additional safety precautions must be taken depending on the application to avoid injury to people and damage to machinery.

NOTICE

The motor output of the multi-axis servo inverter may only be switched or disconnected when the **output stage is inhibited**.

6.2 Displays of the supply and axis modules

6.2.1 Operating display of the 7-segment display



- The two 7-segment displays indicate the operating state of the supply modules and axis modules.
- All settings and functions relating to startup of the axis system are located in the axis module. That is the reason for more operating displays in the axis module than in the supply module. The supply module is not equipped with any programmable intelligence.
- Responses to detected errors and warnings take place in the axis module only. The error and warnings are, however, displayed in the axis module and to some extent in the supply module. For some events, other numbers may be displayed in the axis module than in the supply module. These events are marked in the operating display table of the supply module.
- The displays for the axis modules and the supply modules are therefore described separately.

6.2.2 Error display of the 7-segment display

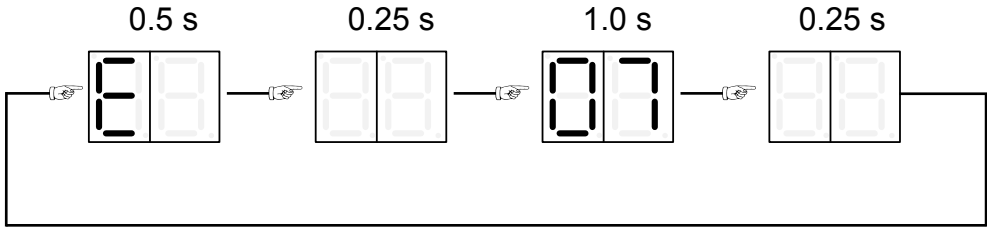
The MOVIAXIS® multi-axis servo inverter detects any errors that occur and displays them as error code. Each error is clearly defined by its error code and corresponding attributes, such as

- the error response,
- the final status after executing the error response,
- the type of reset response.

Error message with two 7-segment displays

The error codes are indicated as flashing numeric values in the axis and supply module.

The error code is displayed in the following display sequence:



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In addition to the error code, a "sub-error code" has been defined to further localize the reason for the error. The "sub-error code" can be read by the operator via the communication connection.

The display can jump back to the statistical operation display depending on the type of error and the response programmed for an error.

Errors in the supply module

Errors in the supply module are reported to the axis and processed by the axis.

You execute a reset by interrupting the 24V electronics supply or via the software.

6.2.3 Error list

Explanation of terms used in the error lists

Terms and abbreviations	Meaning
P	Programmable error response
D	Default error response set at the factory
VM	Supply module
AM	Axis module
ZK	DC link
HW	Hardware
SW	Software
AWE	User unit

The final error status determines which reset type will be executed in case of a fault reset, see following table.

Final fault status	Responses to error acknowledgement
Display error only	Warm start (delete fault code)
System is waiting	Warm start (delete fault code)
System is blocked	System restart (execute soft reset)
System is blocked	CPU reset (execute CPU reset)

6.2.4 Responses to error acknowledgement

CPU reset

A true restart of the microcontroller and the firmware will take place in case of a CPU reset. The firmware system is started as though a new axis module has been connected to the network.

A restart of the system has the following effects:

- the bootstrap loader will be activated, "b0" will appear in the display,
- reference positions of incremental encoder systems will be lost,
- any existing fieldbus interfaces will be reset,
- any existing control options will be reset,
- fieldbus communication will be interrupted,
- The interface between options and firmware system is initialized again A new boot synchronization to the fieldbus or control option takes place.
- communication via CAN interfaces of the system will be interrupted,
- connection to the supply module will be synchronized again (hardware information system),
- The active "fault message" is reset [binary output = 1, system status = 0].

The ready signal will be reset by the system status control after the reset by the system status control.

System restart

There will be **no** true reset of the microcontroller with a system restart.

The system restart has the following results:

- the firmware will be restarted, without the boot loader becoming active (no display "b0" !)
- reference positions of incremental encoder systems will be lost,
- any existing fieldbus interfaces are not affected,
- any existing control options are not affected,
- The interface between options and firmware system is initialized again A new boot synchronization to the fieldbus or control option takes place.
- communication via CAN interfaces of the system will be interrupted,
- connection to the supply module will be synchronized again (hardware information system),
- The active "fault message" is reset [binary output = 1, system status = 0].

The ready signal will be reset by the system status control after the reset by the system status control.

Warm start

A warm start only resets the fault code.

The warm start has the following effects:

- The firmware system is not rebooted
- all reference positions will be maintained,
- Communication is not interrupted
- The active "fault message" is reset [binary output = 1, system status = 0].

6.3 Operating displays and errors of the MXP supply module

6.3.1 Table of displays

	Description	Status	Comment / action	Display on the axis module
Displays during standard operation				
rd	Ready for operation (ready)	No error/warning. V_Z = > 100 V	Status display only.	-
Displays of different unit states				
00	DC link voltage missing or less than 100 V.	No error/warning. V_Z = > 100 V	Check supply system.	X
Displays in case of warnings				
82	I^2xt prewarning.	Utilization of the supply module has reached the prewarning level.	Check application regarding utilization.	P
85	Temperature prewarning.	The temperature of the supply module is approaching the cut-off threshold.	Check application regarding utilization, check ambient temperature.	P
87	Prewarning: Utilization of internal braking resistor ≥ 80%	Unit is ready for operation	Check unit utilization / project planning. Affects only MXP81.	-

6.3.2 Table of errors

	Description	Status	Comment / action	Display on the axis module
Displays in case of an error				
04	Error brake chopper.	Brake chopper is not ready for operation.	See error list of axis modules.	X
07	Error excessive ZK voltage U_z.	Error message by SM via signaling bus when DC link voltage is too high.	Check application design and braking resistor.	X
81	Error excessive ZK current.	The DC link current in the supply module has exceeded the maximum limit of 250 % $I_{nominal}$.	Check application regarding utilization.	X
83	Error I^2xt monitoring.	Utilization of the supply module has reached the limit value.	Check application regarding utilization.	X
86	Error temperature monitoring.	Temperature of the supply module has reached the switch-off threshold.	Check application regarding utilization, check ambient temperature.	X
88	Switch-off due to internal braking resistor overload	The unit is not ready for operation any longer	Check unit utilization / project planning. Affects only MXP81.	x
89	Error voltage supply (switched-mode power supply module inside unit).	A supply voltage inside the unit is defective.	Check connected loads for overcurrent or unit for defects.	-
90	Thermal overload of the additional capacity	Additional capacity at full capacity. Error response only depending on the settings made for the axis modules.	Braking resistor converters regenerative energy into heat. Check unit utilization / project planning. Affects only MXP81.	x
91	Error voltage supply (switched-mode power supply module inside unit).	A supply voltage inside the unit is defective.	Check connected loads for overcurrent or unit for defects.	-

6.4 Operating displays and errors of MXA axis module

6.4.1 Table of displays

	Description	Status	Comment / action
Displays during boot process			
b0	Unit passes through several states when loading the firmware (boot) to get ready for operation.	• Status: not ready. • Output stage is inhibited. • No communication possible.	• Waiting for boot process to finish. • Unit stays in this condition: Unit defective.
b1			
b2			
b3			
br			
Displays of different unit states			
00	DC link voltage missing	• Status: not ready. • Output stage is inhibited. • Communication is possible.	Check supply system.
C1	Supply module not ready for operation.		Check supply module.
C2	Axis module 24 V or internal switched-mode power supply module of axis not ready for operation.		24 V check or unit defective.
C2 flashing	Axis module in safe stop.		Safety function activated.
C3	Incorrect synchronization with bus. Process data processing not available.		• Check bus connection. • Check synchronization setting at unit and controller. • Check process data settings at unit and controller. • Check for missing PDO.

C4
flashing
	The encoder evaluation is not ready.		• Encoders are initialized.
			• Unit stays in this condition:
			  • No encoder selected.
			  • "Source of actual speed" parameter shows an encoder that does not exist.

Displays during initialization processes (parameters will be reset to default values)			
d0	Basic initialization.	• Status: not ready. • Output stage is inhibited. • Communication is possible.	Waiting for initialization to finish.
d1	Initialization of delivery state.		
d2	Initialization of factory setting.		
d3	Initialization of customer-specific set 1.		
d4	Initialization of customer-specific set 2.		

	Description	Status	Comment / action
Displays during standard operation			
	Output stage inhibit	• Output stage is inhibited.	The drive is not actuated by the output stage. The brake is applied; without brake the motor coasts to a halt. This FCB is permanently selected with terminal DI00. But it can be additionally selected by other sources.
	Unassigned	For further information refer to the MOVIAXIS® parameter description	
	Unassigned		
	Unassigned		
	n-control (speed control)		Speed control with internal ramp generator.
	Interpolated n-control		Speed control with setpoints cyclically via bus. The ramp generator is located externally, e.g. in the higher-level controller.
	M-control (torque control)		Torque control
	Interpolated M-control		Torque control with setpoints cyclically via bus.
	Position control		Positioning mode with internal ramp generator.
	Interpolated position control		Positioning mode with setpoints cyclically via bus. The ramp generator is located externally, e.g. in the higher-level controller.
	Reference travel		The drive performs reference travel.
	Stop		Deceleration at application limit. This FCB also becomes active if no other FCB is selected as default FCB.
	Emergency stop		Deceleration at emergency stop limit.
	Stop at system limit		Deceleration at system limit.
	Electronic cam		Electronic cam active.
	Synchronous operation		Synchronous operation active.
	Calibrate incremental encoder		Encoder commutation for synchronous motors.
	Hold control		Position control at current position.
	Jog mode		Jog mode active.
	Brake test		Brake is tested by applying torque while brake is closed.
	Multi-drive		Is used to operate 2, 3 or 4 motors in interpolated speed control mode.
	Rotor position identification		Is used for communication detection of synchronous motors.
	Stop at user limits		Is used for stopping at user limits.

6.4.2 Table of errors

	INFORMATION Errors or sub-error codes, which are not included in the following list, can be displayed within the framework of displayed errors. In this case, contact SEW-EURODRIVE.

A "P" in the column "Error response" indicates that the response is programmable. The factory set error response is listed in the "Error response" column.

The following abbreviations are used for the module designations:

- "AM" for axis module
- "SM" for supply module

Error		Sub-error	Error		System state Measure Reset type	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]		
00	No fault (this display is actually an operating display, see operating displays)	**---**	---	---	---	Ready = 1 (depending on system state) Malfunction = 1
01	“Overcurrent” error		• Short-circuit output • Motor too large • Defective output stage	Output stage inhibit	System is waiting Warm start	Ready = 1 Malfunction = 0
02	"UCE monitoring" fault		The fault is an additional kind of overcurrent, measured at the collector-emitter voltage of the output stage. The possible reason behind this fault is identical to fault 01. The distinction is important for internal purposes only.	Output stage inhibit	System is waiting Warm start	Ready = 1 Malfunction = 0
03	"Ground fault"		Ground fault • in the motor lead • in the inverter • in the motor	Output stage inhibit	System is blocked System restart	Ready = 0 Malfunction = 0
04	"Brake chopper" fault		Error message by supply module via signal bus. • Too much regenerative power • Braking resistor circuit interrupted • Short circuit in the braking resistor circuit • Brake resistance too high • Brake chopper defective	Output stage inhibit	System is waiting Warm start	Ready = 1 Malfunction = 0
05	"Timeout HW info system" fault		The connection between supply module and axis module via signaling bus has been interrupted	Output stage inhibit	System is blocked System restart	Ready = 0 Malfunction = 0
		01	Connection to signaling bus interrupted			
		02	Timeout flag signaling bus cannot be reset			
06	"Line phase failure" error		Error message by supply module via signal bus. It was detected that a line phase is missing.	Output stage inhibit	System is waiting Warm start	Ready = 1 Malfunction = 0
07	"DC link" error		Error message by SM via signaling bus when DC link voltage is too high	Output stage inhibit	System is waiting Warm start	Ready = 1 Malfunction = 0

Error		Sub-error	Error		System state	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]	Measure Reset type	
08	Error "Speed monitoring"		Active speed monitoring has detected an unacceptable deviation between setpoint and actual speed	Output stage inhibit	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	Motor speed monitoring			
		02	Regenerative speed monitoring			
		03	System limit actual speed exceeded			
11	"AM overtemperature" error		Temperature of the AM has reached or exceeded the cut-off threshold. Possible reasons: • Ambient temperature too high • Unfavorable air convection • Defective fan • Medium utilization too high	Display only	----------	Ready = 0 Malfunction = 0
		01	Limit heat sink temperature exceeded.			
		02	Second temperature sensor of the electronics signals overtemperature.			
		12	Second temperature sensor of the electronics signals overtemperature prewarning.			
12	"Brake output" error		• No brake connected • Brake line separated in "on" status • Overload through overcurrent > 2A (F13 has priority) • Overload due to excessive connection (approx. > 0.5 Hz) Monitoring is only active with parameter settings "Brake installed" and "Brake applied".	Output stage inhibit	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	Brake output			
13	"Brake supply" error		Brake supply voltage not within permitted range of +10% / - 0%. Monitoring only possible with parameter settings "Brake installed" and "Brake applied" as well as with CMP and DS motors.	Output stage inhibit	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	Brake supply voltage			
14	"Resolver" error		Error with resolver or resolver evaluation.	Output stage inhibit	System is blocked System restart	Ready = 0 Malfunction = 0
		01	Wire breakage detection of resolver			
		02	Emulation error resolver (excessive speed)			
		03	Invalid period of the synchronization signal			
		04	Synchronization signal failure			
		05	Incorrect parameter setting of DSP			
		06	Saturation at AD converter input			
		07	Unable to initialize PLL			
		08	CRC error via data flash (X-Flash)			
		09	CRC error via program flash (P-Flash)			
		10	CRC error via program flash (P-Flash)			
		11	Watchdog of DSP has triggered			
		12	Invalid instruction in DSP			
		13	Unexpected interrupt in DSP			
		14	Software interrupt in DSP			
		15	Hardware stack overflow in DSP			
		16	ONCE trap in DSP			

Error		Sub-error	Error		System state Measure Reset type	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]		
		17	Interrupt A in DSP			
		18	Interrupt B in DSP			
		19	Non-permissible angle during calibration			
		20	Error deleting flash during calibration			
		21	Error programming flash during calibration			
		22	Error verifying flash during calibration			
		23	Resolver evaluation not calibrated			
		24	PLL has locked during operation			
		256	Init phase of DSP not finished within permitted time period			
		267	Ready signal of DSP not within permitted time period			
		512	Protection against division overflow by limiting the actual speed		Set the correct system numerator/denominator values.	
15	"Absolute encoder" error		An error has occurred in the checksum of the Hiperface® signals.	Output stage inhibit	System is blocked System restart	Ready = 0 Malfunction = 0
	Encoder input of basic unit	**01**	Comparison of the absolute encoder position (via Hiperface® parameter channel) with the incremental position of the axis every second.		• Check track signal wiring. • Check interference sources • Replace encoder • Replace card	
		02	Unknown encoder type		Clarify whether this encoder can be used	
		03	Corrupt encoder nameplate data Incorrect block checksum of the data field range of the encoder manufacturer.		Replace encoder	
		32 – 67	Hiperface® encoder signals internal error. The error code is displayed as follows: [Displayed value] -32. You can inquire about this error code at the encoder manufacturer.		• Check wiring and interference sources • If the problem persists, replace the encoder	

Error		Sub-error	Error		System state	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]	Measure Reset type	
	Encoder input of basic unit	**256**	• SSI encoder: Voltage range of the voltage supply (12 V)		• Check voltage supply to SSI encoder	
			• SSI encoder signals an error by a set error bit in the SSI protocol		• Check settings on SSI encoder (error bit) • Check wiring • Check interference sources • Replace encoder	
		257	SSI encoder: Interrupted clock or data line		• Check wiring • Check interference sources, also supply voltage • Check startup parameters • Replace encoder	
		258	SSI encoder: Position outside tolerance range		• Check interference sources (interrupted beam, reflector, data lines, etc.) • Check startup parameters	
		259	SSI encoder: SSI clock sequence does not match speed sampling interval		• Increase SSI clock rate • Check startup parameters	
		260	SSI encoder: User defined fault via fault mask		• SSI encoder signals error, see data sheet of encoder • Check startup parameters	
		261	SSI encoder: No high level present		• Check wiring • Replace encoder	
		513	Faulty comparison of EnDat encoder between raw position and track counter		• Check track signal wiring. • Check interference sources • Replace encoder • Replace card	
		514	Invalid EnDat parameter measuring steps		• Perhaps no EnDat encoder can be used! • Replace encoder	
		515	Invalid EnDat parameter resolution		• Perhaps no EnDat encoder can be used! • Replace encoder	
		516	Invalid EnDat parameter multi-turn		• Perhaps no EnDat encoder can be used! • Replace encoder	
		544 – 575	EnDat encoder signals error statue. Error codes are listed in the EnDat protocol description. EnDat error code = subcode - 544 or subcode - 4640 or subcode - 8736		• Replace encoder	

Error		Sub-error	Error		System state Measure Reset type	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]		
	Encoder option 1	**4097**	Comparison of the absolute encoder position (via Hiperface® parameter channel) with the incremental position of the axis every second.		• Check track signal wiring. • Check interference sources • Replace encoder • Replace card	
		4098	Unknown encoder type			
		4099	Corrupt encoder nameplate data Incorrect block checksum of the data field range of the encoder manufacturer.		Replace encoder	
		4128 – 4163	Hiperface® encoder signals internal error. The error code is displayed as follows: [Displayed value] -4128. You can inquire about this error code at the encoder manufacturer.		• Check wiring and interference sources • If the problem persists, replace the encoder	
		4352	SSI encoder option 1: Voltage range of the voltage supply (12 V)		Check voltage supply to SSI encoder	
		4353	SSI encoder option 1: Interrupted clock or data line		Check connection to SSI encoder	
		4354	SSI encoder option 1: Position outside tolerance range		Minimize interference	
		4355	SSI encoder option 1: SSI clock sequence does not match speed sampling interval		Set a higher cycle frequency	
		4356	SSI encoder option 1: User defined fault via fault mask			
		4357	SSI encoder option 1: No high level present		Replace option card or encoder	
	Encoder option 1	**4609**	Incorrect comparison between raw position and check counter with EnDat encoder			
		4610	Incorrect EEPROM values in encoder			
		4611	Incorrect EEPROM values in encoder			
		4612	Incorrect EEPROM values in encoder			
		4640 – 4671	EnDat encoder signals error status. The error code is displayed as follows: [displayed value] - 5640. Error codes are listed in the EnDat protocol description.			
		4672	EnDat encoder signals internal warning			

Error		Sub-error	Error		System state Measure Reset type	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]		
	Encoder option 2	**8193**	Comparison of the absolute encoder position (via Hiperface® parameter channel) with the incremental position of the axis every second.		• Check track signal wiring. • Check interference sources • Replace encoder • Replace card	
		8194	Unknown encoder type			
		8195	Corrupt encoder nameplate data Incorrect block checksum of the data field range of the encoder manufacturer.		Replace encoder	
		8224 – 8259	Hiperface® encoder signals internal error. The error code is displayed as follows: [Displayed value] -8224. You can inquire about this error code at the encoder manufacturer.		• Check wiring and interference sources • If the problem persists, replace the encoder	
		8448	SSI encoder signal voltage drop			
		8449	SSI encoder wire breakage detected			
		8450	SSI encoder position not within tolerance			
		8451	SSI encoder SSI clock sequence does not match speed sampling interval		Increase clock frequency	
		8452	SSI encoder user-defined error via fault mask			
		8453	SSI encoder No high level present		Replace option card or encoder	
		8705	Incorrect comparison between raw position and check counter with EnDat encoder			
		8706	Incorrect EEPROM values in encoder			
		8707	Incorrect EEPROM values in encoder			
		8708	Incorrect EEPROM values in encoder			
		8736 – 8767	EnDat encoder signals error status. The error code is displayed as follows: [displayed value] - 8736. Error codes are listed in the EnDat protocol description.			
		8768	EnDat encoder signals internal warning			

Error		Sub-error	Error		System state	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]	Measure Reset type	
16	"Startup" error		Error during startup	Output stage inhibit	System is blocked System restart	Ready = 0 Malfunction = 0
		01	Denominator of pole pair number of resolver not equal to 1			
		02	Numerator of pole pair number of resolver too great			
		03	Numerator of pole pair number of resolver too small, that means zero			
		04	Denominator of emulation PPR count for resolver not equal to 1			
		05	Numerator of emulation PPR count for resolver too small			
		06	Numerator of emulation PPR count for resolver too great			
		07	Numerator of emulation PPR count for resolver is not a power of two			
		08	Denominator of emulation PPR count for sine encoder not equal to 1			
		09	Numerator of emulation PPR count for sine encoder too small			
		10	Numerator of emulation PPR count for sine encoder too great			
		11	Numerator of emulation PPR count for sine encoder is not a power of two			
		100	The motor-inverter combination cannot reach the required test torque with the present limit values		Check limit values, adjust test torque	
		512	Startup for invalid motor type			
		513	Set current limit exceeds maximum current of axis			
		514	Set current limit is less than nominal magnetizing current of the motor			
		515	CFC: Factor for calculation of q-current cannot be displayed			
		516	Non-permitted PWM frequency configured			
		517	Parameter "Final speed flux table" not within permitted range			
		518	Parameter "Final flux ID table" not within permitted range			
		519	Output stage enable requested without valid motor startup			
		520	Motor startup not possible with enabled output stage			
		521	Factor for torque limit cannot be displayed (A)			
		522	Factor for torque limit cannot be displayed (B)			
		525	Factors for current setpoint filter cannot be displayed			
		526	Factors for current increase limit cannot be displayed			
		527	Position FIR filter cannot show the encoder delay			
		528	Speed FIR filter cannot show the encoder delay			
		529	Thermal motor monitoring I2t: Two points with identical speed in the torque-speed characteristics		Increase distance between curve points	

Error		Sub-error	Error		System state	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]	Measure Reset type	
		530	Max. motor current configured incorrectly			
		531	Rotor position identification: Forward correction table does not increase in strict monotonous manner			
		532	Rotor position identification: CMMin too small		Nominal axis current too high compared to motor	
		533	Rotor position identification not permitted for started-up motor			
		534	PWM frequency for FCB 25 must be 8 kHz		Set PWM frequency to 8 kHz	
		535	Index TMU-Init not set		Set TMU-Init index	
		1024	NV memory parameter of nominal unit current is greater than NV memory parameter of current measuring range			
		1025	NV memory parameter of current measuring range is zero			
		1026	NV memory parameter of current measuring range is zero			
		1027	NV memory parameter of current measuring range is too large			
		1028	System limits for speed are greater than max. possible speed			
		1029	Application limits for speed are greater than max. possible speed			
		1030	Invalid sensor type set for output stage temperature			
		1031	CFC: No absolute encoder used as motor encoder in synchronous motors			
		1032	CFC: No absolute encoder used as motor encoder in synchronous motors			
		1033	Position range in position detection mode "without overflow counter" exceeded		Check project planning of travel distance	
		1034	FCB dual drive: Lag error window may not be smaller than "standard" lag error window			
		1035	FCB dual drive: Lag error window may not be smaller than adjustment threshold			
		1036	Modulo reference offset is not within Modulo limit		Perform error-free startup	
		1037	Position values of software limit switch reversed, positive < negative			
		1038	Encoder system: Denominator factor (system unit) larger than or equal to numerator factor (system unit)		• Perform startup • Increase numerator factor (system unit)	
		1039	Encoder option 1 unable to evaluate set encoder type		Encoder must be operated on XGS11A	
		1040	Encoder option 2 unable to evaluate set encoder type		Use corresponding option card or connect the required encoder to the proper hardware	
		1041	The device of option is unable to evaluate the set encoder type		Use corresponding option card or connect the required encoder to the proper hardware	
		1042	No commutation present		Set commutation with FCB25	

Error		Sub-error	Error		System state Measure Reset type	Binary output signal[1)]
Code	Signal	Code	Cause	Response[2)]		
		1043	Standstill current not permitted for synchronous motor		Disable standstill current function	
17	Internal computer error (traps)		CPU has detected an internal error	Output stage inhibit	System is waiting Warm start	Ready = 1 Malfunction = 0
18	Internal software error		The software has detected a non-permissible state.	Output stage inhibit	System is blocked System restart	Ready = 0 Malfunction = 0
19	Process data error		Invalid process data	Output stage inhibit	System is blocked System restart	Ready = 0 Malfunction = 0
		01	Process data: Negative maximum torque indicated			
		02	Process data: Positive minimum torque indicated			
		03	Process data: Negative motor torque limit indicated			
		04	Process data: Negative regenerative torque limit indicated			
		05	Process data: Torque limit for quadrant 1 is negative			
		06	Process data: Torque limit for quadrant 2 is negative			
		07	Process data: Torque limit for quadrant 3 is negative			
		08	Process data: Torque limit for quadrant 4 is negative			
		09	Torque control: Maximum speed < minimum speed			
		10	Position control: Maximum speed value < 0			
		11	Position control: Maximum speed < 0			
		12	Position control: Minimum speed > 0			
		13	Process data: Enter negative acceleration			
		14	Process data: Enter negative deceleration			
		15	Process data: Enter negative jerk			
		16	Combination of FCB number and FCB instance does not exist			
		17	Target position not within limit switch range			
		18	Test torque during brake test exceeds system limit		Set test torque smaller than system limit	
		19	Process data: Negative velocity limit		Specify positive velocity limit	
		20	Parameter set changeover requested with active output stage.		First inhibit the output stage (select FCB01 or enable = 0) before changing to another data set via process data	
		21	Selection for target or source not within permitted range		Selections for target and source must be valid table indices	
		30	FCB 09: Target in user-defined unit not within set modulo range		Adjust modulo underflow and modulo overflow to the travel range used / select target values in such a way that they are within the active modulo range.	

Error		Sub-error	Error		System state	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]	Measure Reset type	
		31	FCB 09: Target specified in user-defined unit results in target overflow in system units		Increase resolution of user-specified unit for position	
		32	FCB 09: Modulo underflow >= Modulo overflow		Swap values of modulo underflow and modulo overflow	
		33	FCB 09: Absolute target position requested but not referenced.		Perform reference travel for position encoder	
		34	FCB 09: Acceleration or deceleration limit = 0 transferred		Check local setpoint, application limits, system limits, transferred process data	
20	Electronic cam lag error		The preset lag error limit in electronic cam mode was exceeded	Output stage inhibit	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	CAM: Electronic cam lag error			
21	Lag error dual drive		The preset lag error limit in dual drive mode "Engel" was exceeded	Output stage inhibit	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	FCB dual drive: Lag error in adjustment phase			
		02	FCB dual drive: Lag error in standard operation			
25	"Non-volatile parameter memory" error		An error was detected during access to non-volatile parameter memory.	Output stage inhibit	System is blocked System restart	Ready = 0 Malfunction = 0
		01	NV memory address access			
		02	NV memory runtime error (MemoryDevice)			
		03	Error reading data from non-volatile memory. Data cannot be used due to faulty identification or checksum.			
		04	Initialization error of memory system.			
		05	The read-only memory contains invalid data.			
		06	The read-only memory contains incompatible data of another device (in case of exchangeable data memories)			
		07	NV memory initialization error			
		08	NV memory internal error			
		09	NV memory JFLASH error			
		10	NV memory FLASH module error			
26	"External terminal" error		A binary input terminal has signaled an error.	Stop with emergency stop delay (D), (P)	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	External terminal error			
27	"Limit switch" error		One or both limit switches cannot be detected at the programmed input terminals or in the control word.	Shutdown with emergency stop delay	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	Both limit switches missing or wire breakage			
		02	Limit switch reversed			
28	"Fieldbus timeout" error		Process data communication is interrupted.	Stop with emergency stop delay (D), (P)	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	Error Fieldbus timeout			

Error		Sub-error	Error		System state Measure	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]	Reset type	
29	"Hardware limit switch reached" error		Hardware limit switch reached during positioning	Stop with emergency stop delay (D), (P)	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	Right limit switch approached			
		02	Left limit switch approached			
30	"Deceleration time-out" error		The drive did not come to a standstill within the preset delay time.	Output stage inhibit	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	Stop ramp time violation			
		02	Time violation stop at application limit			
		03	Time violation stop at system limit			
		04	Emergency stop ramp time exceeded			
31	"TF/TH Temperature protection motor" fault		Overtemperature sensor (KTY/TF/TH) of the drive has triggered for motor protection	"No response" (D), (P)	No response	Ready = 1 Malfunction = 1
		01	Wire breakage of motor temperature sensor detected			
		02	Short circuit of motor temperature sensor detected			
		03	Motor overtemperature KTY			
		04	Motor overtemperature (synchronous motor model)			
		05	Motor overtemperature (TF/TH)			
		06	Motor overtemperature I2t model			
33	"SM Boot Timeout" error		The supply module is not or no longer ready for operation.	Output stage inhibit	System is blocked System restart	Ready = 0 Malfunction = 0
		01	Boot synchronization with supply module error			
36	"Lag distance synchronous operation" error		A preset, maximum permitted lag distance was exceeded during synchronous operation	Output stage inhibit	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	FCB synchronous operation: Lag error			
37	Error "System watchdog"		Internal watchdog timer setting has been exceeded	Output stage inhibit	System blocked / CPU reset	Ready = 0 Malfunction = 0
38	"Technology functions" error		Error in a technology function	Stopping with application limits, programmable	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	Cam function: Trip point with negative edge < positive edge has been entered			
		02	Cam function: Command overflow trip-point processing			
		03	Cam: Incorrect flow control block type			
		04	Cam: Incorrect flow table block type			
		05	Cam: Incorrect ProfGen block type			
		06	Cam: Incorrect derivate gen. block type			
		07	Cam: Incorrect motor mgmt. block type			
		08	Cam: Flow control block version is newer than that of the firmware			
		09	Cam: Flow table block version is newer than that of the firmware			

Error		Sub-error	Error		System state	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]	Measure Reset type	
		10	Cam: ProfGen block version is newer than that of the firmware			
		11	Cam: Derivate gen. block version is newer than that of the firmware			
		12	Cam: Motor mgmt. version is newer than that of the firmware			
		13	Cam: Start address of cam flow table block not within DDB			
		14	Cam: The denominator of a mathematical curve must not be zero			
		15	Cam: Invalid start curve type			
		16	Cam: This curve type is not permitted			
		17	Cam: The length of the mathematical curve must be greater than or equal to 2			
		18	Cam: The master cycle of a curve defined by control points must be greater than zero			
		19	Cam: A sequence of transfer functions is not permitted			
		20	Cam: The sequence of transfer functions to SpeedControl is not permitted			
		21	Cam: The sequence of SpeedControl to math. curve is not permitted			
		22	Cam: The sequence of SpeedControl to abs. position control is not permitted			
		23	Cam: The sequence of SpeedControl to rel. position control is not permitted			
		24	Cam: Start curve number is negative (not initialized)			
		35	Cam: A negative curve number is not permitted (not initialized)			
		26	Cam: A negative start address of a math. curve is not permitted (not initialized)			
		28	Cam: Invalid initialization mode			
		29	Cam: Invalid remaining distance correction mode			
		30	Cam: Start address of Cam_ProfGen block not within DDB			
		31	Cam: Start address of Cam1 block not within DDB			
		32	Cam: Address of Cam1 master source not within DDB			
		33	Cam: Start address of Cam2 block not within DDB			
		34	Cam: Address of Cam2 master source not within DDB			
		35	Cam: Start address of Cam3 block not within DDB			
		36	Cam: Address of Cam3 master source not within DDB			
		37	Cam: Start address of Cam_DerivateGen block not within DDB			
		38	Cam: Address of derivate generator source not within DDB			
		39	Cam: Start address of motor management block not within DDB			

Error		Sub-error	Error		System state Measure Reset type	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]		
		40	Cam: Address of motor management Y source not within DDB			
		41	Cam: Address of motor management V source not within DDB			
		42	Cam: Address of motor management A source not within DDB			
		43	Cam: Address of motor management MPrectrl source not within DDB			
		44	Cam: Address of motor management JRel source not within DDB			
		45	Cam: Address of motor management JRelToPhi source not within DDB			
		46	Cam: The length of the mathematical curve must be greater than or equal to 3			
		47	Cam: Illegal motor management mode			
		48	Cam: Illegal initialization mode of the CAM-Prof-Gen			
		50	PositionSetpointGen: Setpoint calculation is disabled			
		51	PositionSetpointGen: Data structure exceeds DDB limit			
		52	PositionSetpointGen: Incorrect type			
		53	PositionSetpointGen: Version in DDB higher than firmware version			
		54	EGear: Master cycle in position dependent synchronization must not be zero			
		55	EGear: Slave cycle in position dependent synchronization must not be zero			
		56	EGear: The parameters for time-dependent synchronization are invalid			
		57	PositionSetpointGen: Filter time not within limits			
		58	PositionSetpointGen: Slave factor is zero			
		59	EGear: Parameter not activated			
		60	EGear: Incorrect type			
		61	EGear: Version in DDB higher than firmware version			
		62	PositionSetpointGen: ModuloMin >= ModuloMax or a parameter not within limits			
		63	PositionSetpointGen: Position source not within DDB			
		80	Position source not within DDB			
		100	VEncoder: Data structure exceeds DDB limit			
		101	VEncoder: Incorrect type			
		102	VEncoder: Version in DDB higher than firmware version			
		103	VEncoder: Invalid ramp parameters			
		104	VEncoder: Divisor is zero			
		105	VEncoder: ModuloMin >= ModuloMax			
		106	VEncoder: Specified target not within permitted range			

Error		Sub-error	Error		System state	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]	Measure Reset type	
		107	VEncoder: PositionIni not within permitted range			
		108	VEncoder: Invalid operating mode			
		109	VEncoder: Speed is so high that ModuloValue is exceeded in 500µs			
		110	VEncoder: Parameter max. velocity, max. jerk not within permitted range			
		120	DataRecord: Data structure exceeds DDB limit			
		121	DataRecord: Incorrect type			
		122	DataRecord: Version in DDB higher than firmware version			
		123	DataRecord: Interpolation time not within limits			
		124	DataRecord: ModuloMin >= ModuloMax or a parameter not within limits			
		125	DataRecord: Position source not within DDB			
		126	DataRecord: The interrupt source has changed in "Wait for interrupt" condition			
		127	DataRecord: The interrupt level has changed in "Wait for interrupt" condition			
		128	DataRecord: PositionExternSource not within DDB or illegal index			
		140	DataBuffer: Data structure exceeds DDB limit			
		141	DataBuffer: Incorrect type			
		142	DataBuffer: Version in DDB higher than firmware version			
		160	SystemData: Data structure exceeds DDB limit			
		161	SystemData: Incorrect type			
		162	SystemData: Version in DDB higher than firmware version			
		180	EventControl: Incorrect type			
		181	EventControl: Version in DDB higher than firmware version			
		182	EventControl: ModuloMin >= ModuloMax or a parameter not within limits			
		183	EventControl: Source not within DDB			
		184	CAM controller: Invalid DDB structure length			
		185	CAM controller: Invalid DDB structure type			
		186	CAM controller: Invalid DDB structure version			
		187	CAM controller: Invalid data source			
		188	CAM controller: Invalid cam reference			
		189	CAM controller: Invalid cam data			
		190	CAM controller: Track error			
39	"Reference travel" error		An error has occurred during reference travel	Output stage inhibit (D), (P)	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	FCB reference travel: Timeout error during search for zero pulse			
		02	FCB reference travel: Hardware limit switch before reference cam			

Error		Sub-error	Error		System state Measure Reset type	Binary output signal[1)]
Code	Signal	Code	Cause	Response[2)]		
		03	FCB reference travel: Hardware limit switch and reference cam not flush			
		04	FCB reference travel: Referencing for type 0 must be set to TP			
		06	Fixed stop before limit switch/reference cam		Shift or activate limit switch/ reference cam	
		07	Limit switch/reference cam not flush/ overlapping with fixed stop		Set limit switch/reference cam flush/overlapping with fixed stop.	
		08	Reference offset in "Single-turn absolute position" must be smaller than 1 encoder revolution		Set reference offset smaller than 1 encoder revolution	
		99	FCB reference travel: Reference type was changed during travel			
40	"Boot synchronization" error		Synchronization with an option card could not be executed appropriately	Output stage inhibit	System is blocked System restart	Ready = 0 Malfunction = 0
		01	Option bus not ready or option card faulty			
		02	Timeout at boot synchronization with option or option card faulty			
		03	New boot synchronization required for NG-DPRAM option			
		04	Timeout at boot synchronization with option or option card fault		Check connection to option bus	
41	Error "Watchdog timer for option"		Connection between main computer and option card computer no longer exists	Output stage inhibit	System is blocked System restart	Ready = 0 Malfunction = 0
		01	Burst on option bus aborted by single access			
		02	Too many options in total or too many options of one kind			
		03	Resource management subsystem option error			
		04	Error in an option driver			
		05	Invalid burst length			
		06	Option found with address selection switch set to 0.		Set address selection switch so it matches the option card slot	
		07	Two options with the same address selection switch detected		Set address selection switch so it matches the option card slot	
		08	CRC error XIA11A		Replace XIA11A option	
		09	Watchdog triggered at XIA11A		Replace XIA11A option	
		10	Alleged XIA11A system tick cycle violation		Report to developer	
		11	SERR on option bus		Replace option	
		12	5-volt reset on XFP11A option			
		13	Watchdog error at CP923X		Replace option or firmware of option	
		14	Timeout during option bus access		Replace option	
		15	Error interrupt for which no cause could be determined			
		18	Error on option bus		Check option card (might be defective)	
		19	Error message from option bus connection		Report firmware error	
		21	No sync signal within a certain wait time			
		22	Sync period not divisible as whole number by basic period			

Error		Sub-error	Error		System state	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]	Measure Reset type	
		23	Invalid sync/basic period ratio			
		24	Sync period interval not within permitted range			
		25	Timer overflow in the area of writing the timer register			
		26	Reference lost between EncEmu and count timer			
		27	Speed too high (max. counts exceeded)			
		28	Illegal parameter (emu. source, emu. hysteresis, emu. resolution)			
		29	Phase controller in setpoint limitation			
		30	No capture occurred			
		31	Encoder option 1 or 2: CRC error in internal flash of XC161		Replace XGH/XGS	
		32	Maximum angle difference exceeded			
		33	XGS/XGH option 1: Position mode is not supported		Firmware update of the option	
		34	XGS/XGH option 2: Position mode is not supported		Firmware update of the option	
42	"Lag distance positioning" error		A preset, maximum permitted following error was exceeded during positioning • Encoder connected incorrectly • Acceleration ramps too short • P component of positioning controller too small • Incorrect speed controller parameters • Value of lag error tolerance too small	Output stage inhibit	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	FCB Positioning lag error			
		02	FCB Jog lag error			
		03	FCB Standard lag error			
43	"Remote timeout" error		An interruption has occurred during control via a serial interface	Stop with application limits	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	FCB Jog mode: Communication timeout at direction control			
		02	The watchdog for secure parameter communication has been activated, but was not re-triggered in time. (No connection to the device or connection too slow)		1. Check connection to device 2. Extend timeout interval of watchdog (max. 500 ms) 3. Decrease utilization of computer to be controlled, close additional programs, such as unnecessary MotionStudio plug-ins	
44	"Ixt utilization" error		Overload in inverter	Output stage inhibit	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	Ixt current limit less than required torque current			
		02	Chip temperature rise limit exceeded			
		03	Chip temperature limit exceeded			
		04	Limit electromechanical utilization exceeded			
		05	Short circuit of sensor detected			
		06	Motor current limit exceeded			
45	"System initialization" error		Error initializing the system	Output stage inhibit	System blocked / CPU reset	Ready = 0 Malfunction = 0

Error		Sub-error	Error		System state	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]	Measure Reset type	
		01	The measured current offsets are outside the permitted limit values			
		02	An error occurred during CRC generation for the firmware			
		03	Data bus error during RAM test			
		04	Address bus error during RAM test			
		05	Memory cell error during RAM test			
		20	Incorrect FPGA version for current firmware		Reload BSP or firmware	
46	"Timeout SBUS #2" error		Communication via SBUS#2 is interrupted	Shutdown with emergency stop delay [P]	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	Timeout CANopen CAN2: Control failure, cable breakage			
50	24 V supply voltage error		Error in 24 V supply voltage	Output stage inhibit	System is blocked System restart	Ready = 0 Malfunction = 0
		01	24 V signals incorrect or switched-mode power supply defective		Check 24 V supply	
		04	Internal AD converter: No conversion carried out			
51	"Software limit switch" error		A software limit switch was approached during positioning	Shutdown with emergency stop delay (D), (P)	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	The right software limit switch was approached			
		02	The left software limit switch was approached			
53	"CRC flash" error		A CRC error occurred while checking the program code by Flash in Code RAM or Resolver DSP.	Output stage inhibit	System is blocked System restart	Ready = 0 Malfunction = 0
		01	CRC32 error in Flash EEPROM section "Initial Boot Loader"			
		02	CRC23 error in Flash EEPROM section "Boot Loader"			
		03	CRC32 error in Flash EEPROM section "DSP firmware"			
		04	CRC32 error in code RAM (firmware) after copying from Flash EEPROM			
		05	CRC32 error in code RAM (firmware) with ongoing control during operation			
		06	CRC32 error in code RAM (firmware) following a software or Watchdog reset (CPU error triggered by code inconsistency)			
		07	CRC32 error in code RAM (firmware): Repeated reading of same memory cell yielded different result			
		09	Correctable bit error detected in Boot Loader Package			
		10	Correctable bit error detected in Board Support Package			
		11	Correctable bit error detected in firmware			

Error		Sub-error	Error		System state	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]	Measure Reset type	
55	"FPGA configuration" error		Internal error in logic component block (FPGA)	Output stage inhibit	System blocked / CPU reset	Ready = 0 Malfunction = 0
56	"External RAM" error		Internal error in external RAM block	Output stage inhibit	System blocked / CPU reset	Ready = 0 Malfunction = 0
		01	Asynchronous DRAM read&write check error			
		02	Asynchronous burst-RAM read & write check error			
		03	Synchronous burst-RAM read check error (burst mode failure)			
		04	FRAM error			
		05	FRAM consistency management error detected			
57	"TTL encoder" error		Error in TTL encoder	Output stage inhibit	System is blocked System restart	Ready = 0 Malfunction = 0
		01	TTL encoder: Broken wire			
		02	TTL encoder: Emulation error (excessive speed)			
		03	TTL encoder: Invalid period of the synchronization signal			
		04	TTL encoder: Synchronization signal failure			
		05	TTL encoder: Incorrect parameter setting of DSP			
		06	TTL encoder: Saturation at AD converter input			
		07	TTL encoder: Unable to initialize PLL			
		08	TTL encoder: CRC error via data flash (X-Flash)			
		09	TTL encoder: CRC error via boot flash (B-Flash)			
		10	TTL encoder: CRC error via program flash (P-Flash)			
		11	TTL encoder: Watchdog of DSP has triggered			
		12	TTL encoder: Invalid instruction in DSP			
		13	TTL encoder: Unexpected interrupt in DSP			
		14	TTL encoder: Software interrupt in DSP			
		15	TTL encoder: Hardware stack overflow in DSP			
		16	TTL encoder: ONCE trap in DSP			
		17	TTL encoder: Interrupt A in DSP			
		18	TTL encoder: Interrupt B in DSP			
		19	TTL encoder: Non-permissible angle during calibration			
		20	TTL encoder: Error deleting flash during calibration			
		21	TTL encoder: Error programming flash during calibration			
		22	TTL encoder: Error verifying flash during calibration			
		23	TTL encoder: Resolver evaluation not calibrated			

Error		Sub-error	Error		System state Measure Reset type	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]		
		24	TTL encoder: PLL has locked during operation			
		256	TTL encoder: Init phase of DSP not finished within permitted time period			
		257	TTL encoder: Ready signal of DSP not within permitted time period			
		512	Encoder of basic unit: TTL encoder: Amplitude control has failed		• Check wiring if the fault occurs immediately • Check disturbance source if the fault occurs sporadically • Replace encoder • Replace card	
		513	Encoder of basic unit: TTL encoder: EPLD reports error		Please contact SEW-EURODRIVE.	
		514	Encoder of basic unit: TTL encoder: Protection against division overflow by limiting the actual speed		Set the correct system numerator/denominator values.	
		4608	TTL encoder option 1: Error in amplitude control			
		4609	TTL encoder option 1: EPLD error message			
		4610	TTL encoder option 1: Protection against division overflow by limiting the actual speed			
		8704	TTL encoder option 2: Error in amplitude control			
		8705	TTL encoder option 2: EPLD error message			
		8706	TTL encoder option 2: Protection against division overflow by limiting the actual speed			
58	"Sine/cosine encoder" error		Error in sine/cosine encoder evaluation	Output stage inhibit	System is blocked System restart	Ready = 0 Malfunction = 0
		01	Sin/cos encoder: Wire breakage detection			
		02	Sin/cos encoder: Emulation error (excessive speed)			
		03	Sin/cos encoder: Invalid period of the synchronization signal			
		04	Sin/cos encoder: Synchronization signal failure			
		05	Sin/cos encoder: Incorrect parameter setting of DSP			
		06	Sin/cos encoder: Saturation at AD converter input			
		07	Sin/cos encoder: Unable to initialize PLL			
		08	Sin/cos encoder: CRC error via data flash (X-Flash)			
		09	Sin/cos encoder: CRC error via boot flash (B-Flash)			
		10	Sin/cos encoder: CRC error via program flash (P-Flash)			
		11	Sin/cos encoder: Watchdog of DSP has triggered			
		12	Sin/cos encoder: Invalid instruction in DSP			
		13	Sin/cos encoder: Unexpected interrupt in DSP			

Error		Sub-error	Error		System state	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]	Measure Reset type	
		14	Sin/cos encoder: Software interrupt in DSP			
		15	Sin/cos encoder: Hardware stack overflow in DSP			
		16	Sin/cos encoder: ONCE trap in DSP			
		17	Sin/cos encoder: Interrupt A in DSP			
		18	Sin/cos encoder: Interrupt B in DSP			
		19	Sin/cos encoder: Non-permissible angle during calibration			
		20	Sin/cos encoder: Error deleting flash during calibration			
		21	Sin/cos encoder: Error programming flash during calibration			
		22	Sin/cos encoder: Error verifying flash during calibration			
		23	Sin/cos encoder: Resolver evaluation not calibrated			
		24	Sin/cos encoder: PLL has locked during operation			
		256	Sin/cos encoder: Init phase of DSP not finished within permitted time period			
		257	Sin/cos encoder: Ready signal of DSP not within permitted time period			
		512	Encoder of basic unit: Sin/cos encoder: Amplitude control has failed		• Check wiring if the fault occurs immediately • Check disturbance source if the fault occurs sporadically • Replace encoder • Replace card	
		513	Encoder of basic unit: Sin/cos encoder: Initialization of track counter not possible		Please contact SEW-EURODRIVE.	
		514	Encoder of basic unit: Sin/cos encoder: Quadrant control has failed		Set the correct system numerator/denominator values.	
		515	Encoder of basic unit: Sin/cos encoder: Protection against division overflow by limiting the actual speed		Set the correct system numerator/denominator values.	
		4608	Sin/cos encoder encoder option 1: Error in amplitude control			
		4609	Sin/cos encoder encoder option 1: Initialization of track counter not possible			
		4610	Sin/cos encoder encoder option 1: Error in quadrant control			
		4611	Sin/cos encoder encoder option 1: Protection against division overflow by limiting the actual speed			
		8704	Sin/cos encoder encoder option 2: Error in amplitude control			
		8705	Sin/cos encoder encoder option 2: Initialization of track counter not possible			
		8706	Sin/cos encoder encoder option 2: Error in quadrant control			
		8707	Sin/cos encoder encoder option 2: Protection against division overflow by limiting the actual speed			

Error		Sub-error	Error		System state Measure Reset type	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]		
59	"Encoder communication" error		Error of Hiperface® encoder or in Hiperface® evaluation	Shutdown with emergency stop delay	System is waiting Warm start	Ready = 1 Malfunction = 0
	Encoder of basic unit	**01**	Hiperface® encoder: Quadrant control has failed		• Delete the serial number when the encoder is disconnected (index 9807, 1/2/3 on standard input, index 9808, 1/2/3 on option 1 and index 9809, 1/2/3 on option 2) • Then connect the encoder again • Restart MOVIAXIS®	
		02	Hiperface® encoder: Incorrect track angle offset. Can happen when the brake is replaced (motor is sent in for brake replacement, encoder is re-calibrated and commutated there)			
		16	Hiperface® encoder: Encoder does not respond during communication		• Check wiring • Replace encoder • Replace card	
		64	Hiperface® encoder: Communication error when reading type		Eliminate disturbance sources	
		128	Hiperface® encoder: Communication error when reading status			
		192	Hiperface® encoder: Communication error when reading serial number			
		256	Hiperface® encoder: Communication error while initializing absolute position			
		320	Hiperface® encoder: Communication error while re-initializing absolute position			
		384	Hiperface® encoder: Communication error while checking absolute position			
		448	Hiperface® encoder: Communication error while writing position			
		512	Hiperface® encoder: No response while reading analog values			
		576	Hiperface® encoder: No response to encoder nameplate request			
		1024	EnDat encoder: Communication error during reset command			
		1088	EnDat encoder: Communication error during position initialization			
		1152	EnDat encoder: Communication error during position validation			
		1216	EnDat encoder: Communication error during memory range select			
		1280	EnDat encoder: Communication error while reading a parameter			
		1388	EnDat encoder: Communication error while writing a parameter			

Error		Sub-error	Error		System state	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]	Measure Reset type	
	Option 1	**4097**	Hiperface® encoder option 1: Error in quadrant control			
		4098	Hiperface® encoder option 1: Incorrect track angle offset			
		4112	Hiperface® encoder option 1: No response to communication request			
		4160	Hiperface® encoder option 1: No response to type request			
		4224	Hiperface® encoder option 1: No response to status request			
		4288	Hiperface® encoder option 1: No response to serial number request			
		4352	Hiperface® encoder option 1: No response to initialization position request			
	Option 1	**4416**	Hiperface® encoder option 1: No response to position re-initialization			
		4480	Hiperface® encoder option 1: No response to position plausibility check			
		4544	Hiperface® encoder option 1: No response to writing of position			
		4608	Hiperface® encoder option 1: No response while reading analog values		Check communication	
		4672	Hiperface® encoder option 1: No response to encoder nameplate request		Check communication	
		5120	EnDat encoder option 1: Communication error during reset command			
		5184	EnDat encoder option 1: Communication error during position initialization			
		5248	EnDat encoder option 1: Communication error during position validation			
		5312	EnDat encoder option 1: Communication error during memory range select			
		5376	EnDat encoder option 1: Communication error while reading a parameter			
		5440	EnDat encoder option 1: Communication error while writing a parameter			

Error		Sub-error	Error		System state Measure Reset type	Binary output signal[1)]
Code	Signal	Code	Cause	Response[2)]		
	Option 2	**8193**	Hiperface® encoder option 2: Error in quadrant control			
		8194	Hiperface® encoder option 2: Incorrect track angle offset			
		8208	Hiperface® encoder option 2: No response to communication request			
		8256	Hiperface® encoder option 2: No response to type request			
		8320	Hiperface® encoder option 2: No response to status request			
		8384	Hiperface® encoder option 2: No response to serial number request			
		8448	Hiperface® encoder option 2: No response to initialization position request			
		8512	Hiperface® encoder option 2: No response to position re-initialization			
		8576	Hiperface® encoder option 2: No response to position plausibility check			
		8640	Hiperface® encoder option 2: No response to writing of position			
		8704	Hiperface® encoder option 2: No response while reading analog values		Check communication	
		8768	Hiperface® encoder option 2: No response to encoder nameplate request		Check communication	
		9216	EnDat encoder option 2: Communication error during reset command			
		9280	EnDat encoder option 2: Communication error during position initialization			
	Option 2	**9344**	EnDat encoder option 2: Communication error during position validation			
		9408	EnDat encoder option 2: Communication error during memory range select			
		9472	EnDat encoder option 2: Communication error while reading a parameter			
		9536	EnDat encoder option 2: Communication error while writing a parameter			
60	"DSP Communication“ error		Error during flash of the DSP	Output stage inhibit	System is blocked System restart	Ready = 0 Malfunction = 0
		01	DSP JTAG Comm error: No JTAG connection			
		02	DSP Once-Comm error: Unable to enter debug state			
		03	DSP Once-Comm error: DSP_CPU not in debug mode before executing a DSP_Code			
		04	DSP Once-Comm error: DSP-PLL not locked, or no external cycle present			
		05	"DSP flash information FW" error Unknown ID code			
		06	"DSP flash information FW" error CRC error while checking one of the three flash areas			
		07	"DSP flash information FW" error Unknown Flash info version in DSP firmware in Tri-Core-Flash			
		08	"DSP flash information DSP" error: Unknown Flash info version in DSP firmware in DSP-Flash			

Error		Sub-error	Error		System state	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]	Measure Reset type	
		09	"DSP flash information DSP" error. DSP code routine for calculation of three CRCs not executed completely			
		10	"DSP flash programming" error: Error deleting the B-flash			
		11	"DSP flash programming" error: Error deleting the P-flash			
		12	"DSP flash programming" error: Error deleting the X-flash			
		13	"DSP flash programming" error: Access to flash register while BUSY bit is set			
		14	"DSP flash programming" error: Access to FIU_CNTL register while BUSY bit is set			
		15	"DSP flash programming" error: Write access to flash while deleting			
		16	"DSP flash programming" error: Write/read access to flash while programming			
		17	"DSP flash programming" error: Flash access not within permitted range			
		18	"DSP flash programming" error: Error verifying B-flash			
		19	"DSP flash programming" error: Error verifying P-flash			
		20	"DSP flash programming" error: Error verifying X-flash			
		21	"DSP flash programming" error: Access to flash register while BUSY flag is set			
		22	"DSP flash programming" error: Access to FIU CNTL register while BUSY bit is set			
		23	"DSP flash programming" error: Write access to flash while deleting			
		24	"DSP flash programming" error: Write/read access to flash while programming			
		25	"DSP flash programming" error: Flash access not within permitted range			
		26	"DSP flash programming" error: No longer used.			
		27	"DSP flash programming" error: No valid programming mode			
		28	"DSP flash programming" error: Length of page and row not defined			
		29	"DSP calibration" error: X-flash CRC error			
		30	"DSP calibration" error: Wire breakage detection of resolver			
		31	"DSP calibration" error: Emulation error resolver (excessive speed)			
		32	"DSP calibration" error: Invalid period of the synchronization signal			
		33	"DSP calibration" error: Synchronization signal failure			
		34	"DSP calibration" error: Incorrect parameter setting			
		35	"DSP calibration" error: Saturation at AD converter input			

Error		Sub-error	Error		System state Measure	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]	Reset type	
		36	"DSP calibration" error: Unable to initialize PLL			
		37	"DSP calibration" error: CRC error via X-Flash			
		38	"DSP calibration" error: B-flash CRC error			
		39	"DSP calibration" error: CRC error via P-Flash			
		40	"DSP calibration" error: Watchdog of DSP has triggered			
		41	"DSP calibration" error: Invalid instruction in DSP			
		42	"DSP calibration" error: Unexpected interrupt in DSP			
		43	"DSP calibration" error: Software interrupt in DSP			
		44	"DSP calibration" error: Hardware stack overflow in DSP			
		45	"DSP calibration" error: ONCE trap in DSP			
		46	"DSP calibration" error: Interrupt A in DSP			
		47	"DSP calibration" error: Interrupt B in DSP			
		48	"DSP calibration" error: Non-permissible angle during calibration			
		49	"DSP calibration" error: Error deleting flash during calibration			
		50	"DSP calibration" error: Error programming flash during calibration			
		51	"DSP calibration" error: Error verifying flash during calibration			
		52	"DSP calibration" error: Resolver evaluation not calibrated			
		53	"DSP calibration" error: PLL has locked during operation			
		54	"DSP calibration" error: Unknown DSP error			
66	"Process data configuration" error		Process data configuration error	Shutdown with emergency stop delay	System is blocked System restart	Ready = 0 Malfunction = 0
		01	The process data configuration has been changed. The entire process data subsystem has to be restarted by means of an inverter reset.			
		102	Process data configuration error: Incorrect input process data length of communication option			
		201	Process data configuration error: 2 I/O PDOs connected to one option		I/O PDOs must be connected with different options	
		301	Two PDO Mapper channels linking to the same target		Eliminate conflict of PDO mapper channels.	
		1001	Software error in process data subsystem: Process data buffer stack overflow			
		1002	Software error in process data subsystem: Process data buffer stack underflow			

Error		Sub-error	Error		System state	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]	Measure Reset type	
		1003	Software error in process data subsystem: Too many users for process data buffer stack			
		1004	Software error in process data subsystem: 1004			
		1005	Software error in process data subsystem: 1005			
		1006	Software error in process data subsystem: 1006			
		1007	Software error in process data subsystem: Too many PDO users			
		1008	Software error in process data subsystem: Too many PDO user nodes			
		1009	Software error in process data subsystem: 1009			
		1010	"Firmware" error: Permitted number of PDO Mapper channels exceeded			
		2000	Software		Restore factory settings	
		2001	Address is 0 or greater than 127		Address 1 to 127 assigned	
		2002	Invalid PDO mapping			
		10001	A PDO configured to CAN has an ID located in the area (0x200-0x3ff and 0x600-0x7ff) used for parameter setting by the SBus.			
		10002	A PDO configured to CAN has an ID located in the area (0x580-0x67f) used for parameter setting by CANopen.			
		10003	A PDO configured to CAN is to transmit more than 4 PD. Only 0 – 4 PD are possible for CAN.			
		10004	Two or more PDOs configured to the same CAN bus use the same ID.			
		10005	Two PDOs configured to the same CAN bus use the same ID.			
		10006	Process data configuration error: Too many PDOs set to CAN (missing mem.)			
		10007	Process data configuration error: Too many PDOs set to CAN (missing can res.)			
		10008	An invalid transmission mode was entered for a PDO configured to CAN.			
		10009	Process data configuration error: Can-ID has already been used by Scope on the same CAN			
		10010	Process data configuration error: Can-ID has already been used by Sync on the same CAN			
		10011	Process data configuration error: Send problems on CAN (double send err.)			
		10012	Process data configuration error: Send problems on system bus (double send err.)			
		10013	Process data configuration error: Send problems on application CAN (double send err.)			
		10014	The inhibit time is not a whole-numbered multiple of the current process data processing		Adjust inhibit time or change current process data processing	

Error		Sub-error	Error		System state Measure	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]	Reset type	
		10015	The event timer is not a whole-numbered multiple of the current process data processing		Adjust event timer or current process data processing	
		10016	The CAN setpoint cycle is not a whole-numbered multiple of the current process data processing		Adjust CAN setpoint cycle or current process data processing	
		10017	The CAN sync period is not a whole-numbered multiple of the current process data processing		Adjust CAN sync period or current process data processing	
		10018	The CAN sync offset is not a whole-numbered multiple of the current process data processing		Adjust CAN sync offset or current process data processing	
		10019	Data acceptance time of synchronous out PDOs greater than or equal to CAN setpoint processing cycle. This means out-PDOs are no longer sent.		Set the time of data acceptance of synchronous out PDOs to a smaller value than the CAN setpoint processing cycle.	
		20001	Configuration conflict with the master			
		20002	Process data configuration error: Bus master has deactivated OUT PDO or specified invalid offset			
		20003	Process data configuration error: Bus master has deactivated IN PDO or specified invalid offset			
		20004	Process data configuration error: More input PDO on K-Net than permitted			
		20005	Process data configuration error: More output PDO on K-Net than permitted			
		20006	Process data configuration error: More PDO words on K-Net than permitted			
67	"PDO timeout" error		An input PDO whose timeout interval is not 0, that has not been set to "Offline" and that has already been received once has exceeded its timeout interval.	Shutdown with application delay (D), (P)	System is waiting Warm start	Ready = 1 Malfunction = 0
		0	PDO 0			
		1	PDO 1			
		2	PDO 2			
		3	PDO 3			
		4	PDO 4			
		5	PDO 5			
		6	PDO 6			
		7	PDO 7			
		8	PDO 8			
		9	PDO 9			
		10	PDO 10			
		11	PDO 11			
		12	PDO 12			
		13	PDO 13			
		14	PDO 14			
		15	PDO 15			
68	"External synchronization" error			Shutdown with emergency stop delay	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	Time limit for expected synchronization signal has been exceeded			

Error		Sub-error	Error		System state	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]	Measure Reset type	
		02	Synchronization lost, synchronization period outside tolerance range			
		03	Synchronization to synchronization signal not possible			
		04	Cycle duration of sync. signal is not a integer multiple of the PDO system duration			
		05	Time limit for synchronization signal exceeded			
		06	Synchronization lost, period of synchronization signal invalid			
		07	No synchronization of the synchronization signal possible			
		08	Duration of system interval too short			
		09	Duration of system interval too long			
		10	Duration of system interval is not a multiple of the base interval			
69	"Prewarning motor overtemperature" error		Motor temperature has exceeded the adjustable prewarning threshold	No response, display only	---------	Ready = 1 Malfunction = 1
		01	Thermal motor protection: Prewarning triggered by KTY temperature			
		02	Thermal motor protection: Prewarning triggered by synchronous motor model temperature			
		03	Thermal motor protection: Warning threshold I2t model exceeded			
70	"Error message word 0" error		The error message of an unknown device was detected in the error message word	No response, display only	---------	
		01	Message error control word 0			
71	"Error message word 1" error		The error message of an unknown device was detected in the error message word	No response, display only	---------	
		01	Message error control word 1			
72	"Error message word 2" error		The error message of an unknown device was detected in the error message word	No response, display only	---------	
		01	Message error control word 2			
73	"Error message word 3" error		The error message of an unknown device was detected in the error message word	No response, display only	---------	
		01	Message error control word 3			
74	"Error message word 4" error		The error message of an unknown device was detected in the error message word	No response, display only	---------	
		01	Message error control word 4			
75	"Error message word 5" error		The error message of an unknown device was detected in the error message word	No response, display only	---------	
		01	Message error control word 5			
76	Error: "Intelligent option"		MOVI-PLC® error	No response, display only	---------	

Error		Sub-error	Error		System state Measure	Binary output signal[1)]
Code	Signal	Code	Cause	Response[2)]	Reset type	
81	"DC link overcurrent SM" error		The DC link current in the supply module has exceeded the maximum limit of 260% $I_{nominal}$.	Output stage inhibit	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	SM: DC link current too high			
82	Prewarning "I²xt monitoring SM"		Utilization of the SM has reached the prewarning level	No response (D), (P)	--------	Ready = 1 Malfunction = 1
		01	SM: Pre-warning Ixt utilization			
83	"I²xt monitoring SM" error		Utilization of the SM has reached or exceeded the cut-off threshold	Output stage inhibit	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	SM: Ixt utilization error			
84	"Brake chopper at AM" error		Error message through supply module via hardware information system. The brake chopper in the supply module is not ready for operation, triggered by BRC short-circuit monitoring or driver voltage monitoring.	Output stage inhibit	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	SM: Brake chopper error			
85	"SM temperature monitoring" prewarning		The temperature of the SM approaches the cut-off threshold	No response (D), (P)	---------	Ready = 1 Malfunction = 1
		01	SM: Temperature prewarning			
86	"SM overtemperature" error		Temperature of the SM has reached or exceeded the cut-off threshold.	Output stage inhibit	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	SM: Temperature error			
87	"Utilization braking resistor in SM" prewarning		The utilization of the braking resistor installed in the SM has reached the prewarning threshold (applies to 10 kW version only)	No response (D), (P)	---------	Ready = 1 Malfunction = 1
		01	SM: Ixt prewarning braking resistor			
88	"Utilization of braking resistor in SM" error		The utilization of the braking resistor installed in the SM has reached or exceeded the prewarning threshold (applies to 10kW version only)	Output stage inhibit	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	Ixt utilization error braking resistor of the SM			
89	"Switched-mode power supply SM" error		Switched-mode power supply SM error	No response	---------	Ready = 1 Malfunction = 1
		01	At least one of the supply voltages in the SM is not present			
91	"SM 24 V voltage supply" warning displayed in supply module only		24 V electronics supply less than 17 V -> No error message for the axis !	No response	---------	Ready = 1 Malfunction = 1
		01	24 V electronics power supply too low			
94	"Device configuration data" error		An error has occurred in the unit configuration data block during testing in the reset phase	Output stage inhibit	System is blocked System restart	Ready = 0 Malfunction = 0
		01	Unit configuration data: Checksum error			
		02	Unit configuration data: Invalid version of the configuration data set			
		03	Unit configuration data: Unexpected rated unit voltage		Correct configuration or adjust firmware	
97	"Copy parameter set" error		Parameter set could not be copied correctly	Output stage inhibit	System is blocked System restart	Ready = 0 Malfunction = 0
		01	Download of parameter set to unit canceled		Repeat download or restore delivery condition	

Error		Sub-error	Error		System state Measure Reset type	Binary output signal[1]
Code	Signal	Code	Cause	Response[2]		
107	"Line components" error		The firmware has detected an error in one of the line components (choke, line filter, line contactor).	Display only	---	
115	"Safety functions" error		Connections X7:1 (+24 V) / X7:2 (RGND) or X8:1 (+24 V) / X8:2 (RGND) are reversed. Check wiring.	Output stage inhibit	System is waiting Warm start	Ready = 1 Malfunction = 0
		01	Safety relays: Switching delay between shutdown channels 1 and 2 is too large		• One safety relay in the device: Check safety circuit board • Two safety relays in the device: Check control/ cabling of both relays. Permitted switching delay: 100 ms	
116	"Timeout MOVI-PLC" error		Communication timeout via DPRAM or SBus between MOVI-PLC® and unit	Emer-gency stop	System is waiting Check communication con-nection Warm start	Ready = 1 Malfunction = 0
197	"Power failure" error		The firmware has detected a power failure	Display only	---	

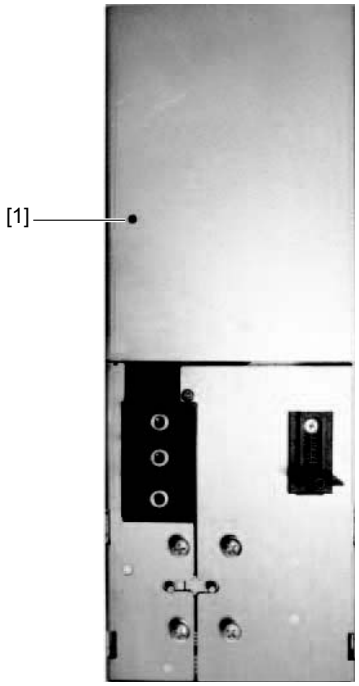
1) valid for default response

2) P = Programmable, D = Default response

6.5 MXC capacitor module operating displays

The operating states are indicated by a two-color LED at the front of the housing.

- LED lights up **green**:
  - Capacitor module is ready for operation.
- LED lights up **red**:
  - General error.
- LED **flashes red** (1 Hz):
  - Limit of capacitor module reached.
- LED does not light up:
  - No voltage is supplied to the capacitor module.



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[1] LED

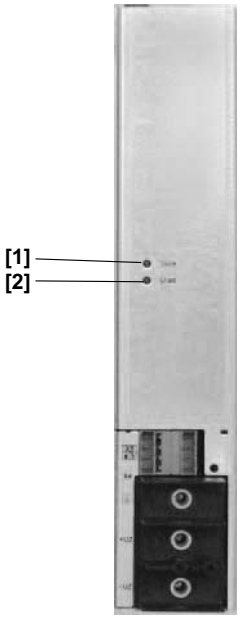
6.6 MXB buffer module operating displays

No messages are issued at the buffer module.

6.7 24-V SMPS module operating displays

The operating status, such as utilization and fault of the switched-mode power supply, is indicated by two LEDs on the front of the unit.

- State LED:
  - Normal operation **green**.
  - Fault **red**. A fault is indicated in case of:
    - Overload,
    - Overvoltage,
    - Undervoltage.
- Load LED:
  - Normal operation **green**.
  - With ca. 80 % utilization per output (8A) **yellow**.



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[1] LED State

[2] LED Load

7 Service

7.1 General information

No inspection or maintenance intervals required during active operation.

7.1.1 Repair service

Please contact **SEW-EURODRIVE electronics service if an error cannot be repaired** (→ "Customer and spare parts service").

When contacting the SEW electronics service, please always quote the production number and order number. so our service personnel can assist you more effectively. You find the production number on the nameplate (page 15).

Provide the following information when sending the unit in for repair:

- Production number (nameplate),
- Type designation
- Unit type
- Digits of the production number and order number
- Short application description (drive type, control)
- connected motor (motor type, motor voltage)
- Nature of the fault
- Accompanying circumstances
- Your own assumptions
- Unusual events preceding the problems.

7.2 Removing/installing a module

This chapter describes how to replace an axis module in the axis system. The master module, capacitor module, buffer module, supply module, DC link discharge module and the 24 V switched-mode power supply unit are all installed/removed in the same way.

7.2.1 Safety notes

Always adhere to the following safety instructions.

⚠ DANGER

Dangerous voltage levels may still be present inside the unit and at the terminal strips up to 10 minutes after the complete axis system has been disconnected from the supply system.

Severe or fatal injuries from electric shock.

To prevent electric shocks:

- Disconnect the axis system from the supply system and wait ten minutes before removing the protective covers.
- After maintenance work, do not operate the axis system unless you have replaced the protective cover because the unit only has degree of protection IP00 without protective cover.

⚠ DANGER

A leakage current > 3.5 mA can occur during operation of the MOVIAXIS® multi-axis servo inverter.

Severe or fatal injuries from electric shock.

To prevent electric shock:

- With a supply system lead < 10 mm^2, route a second PE conductor with the same cross section as the supply system lead via separate terminals. Alternatively, you can use a PE conductor with a copper cross section ≥ 10 mm^2 or aluminum ≥ 16 mm^2.
- With an incoming supply line ≥ 10 mm^2, it is sufficient to install a PE conductor with a copper cross section ≥ 10 mm^2 or aluminum ≥ 16 mm^2.
- If an earth leakage circuit breaker can be used for protection against direct and indirect contact, it must be universal current sensitive (RCD type B).

7.2.2 Tightening torques

Tightening torques	
Retaining screws of the protective covers	0.8 Nm
Retaining screws of the DC link connections	3 – 4 Nm

7.2.3 Removing an axis module

Remove an axis module in the following sequence:

Disconnecting the axis system from the power supply

- Disconnect the entire axis system from the power supply. Observe the safety notes (page 224).

Shield clamps

- Remove the electronics shield clamps **[2]**.

Cables

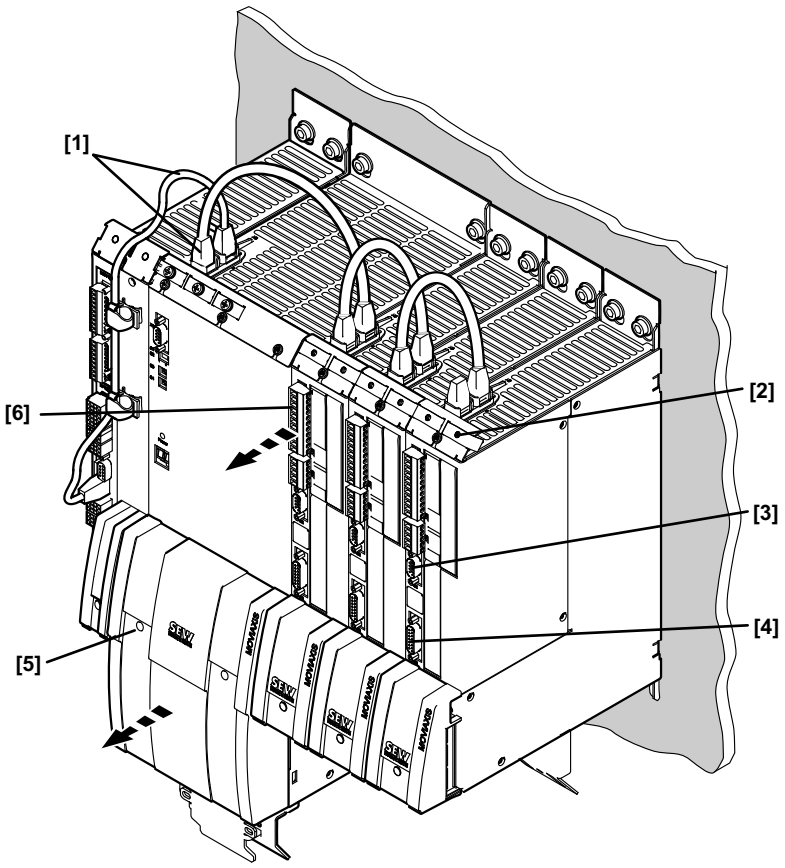
- Remove the plugs of the encoder cables **[4]** (X13).
- Remove the plugs of the signal bus cables **[1]** (X9a, X9b).
- Remove the plugs of the CAN2 connection cables **[3]** (X12), if there are any.

Covers

- Remove covers **[5]**, also those of the units to the left and right of the unit that is to be removed.

Signal lines

- Remove the plugs of the signal cables **[6]** (X10, X11).



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24 V cables

- Remove the 24 V cable plugs for the electronics and brake supply **[8]** (X5a, X5b).

DC link bars

- Remove DC link bars **[13]** of the respective units (X4).

Shield plate

- Remove shield plate on the power terminal **[10]**:
  - Loosen the screw.
  - Remove shield plate in downward direction.

Motor lines

- Remove the plugs of the motor cables **[12]** (X2).

Brake control

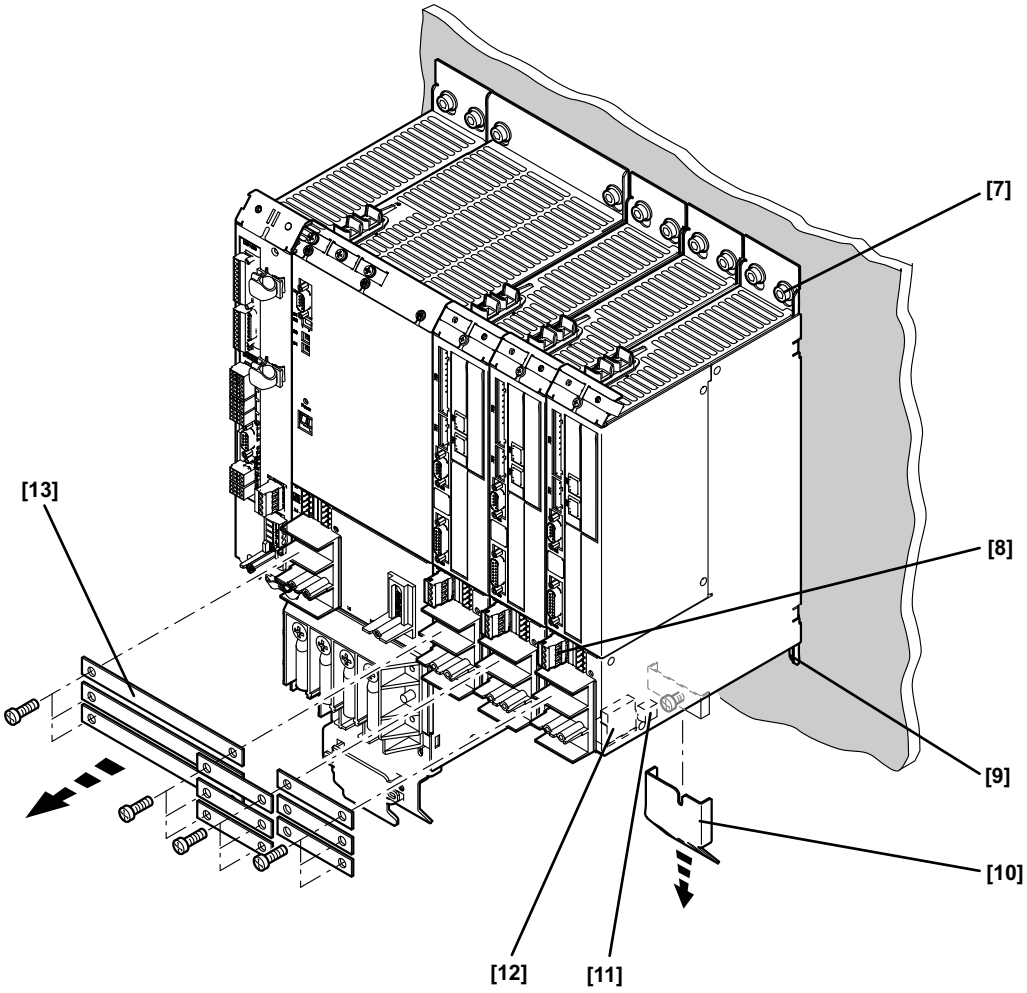
- Remove the plugs of the brake control cables **[11]** (X6).

Safety relays

- Remove safety relay plugs, if there are any.

Retaining screws

- Loosen the 2 lower retaining screws **[9]** of the axis module.
- Loosen the 2 upper retaining screws **[7]** of the axis module.



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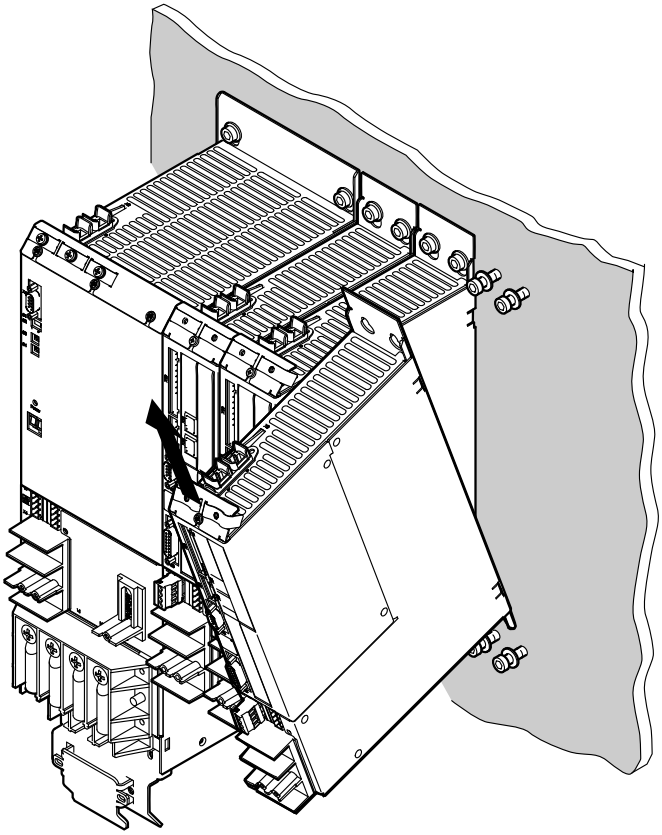
Removing the axis module

- Lift the axis module a little and tilt it to the front. Lift the axis module out completely.



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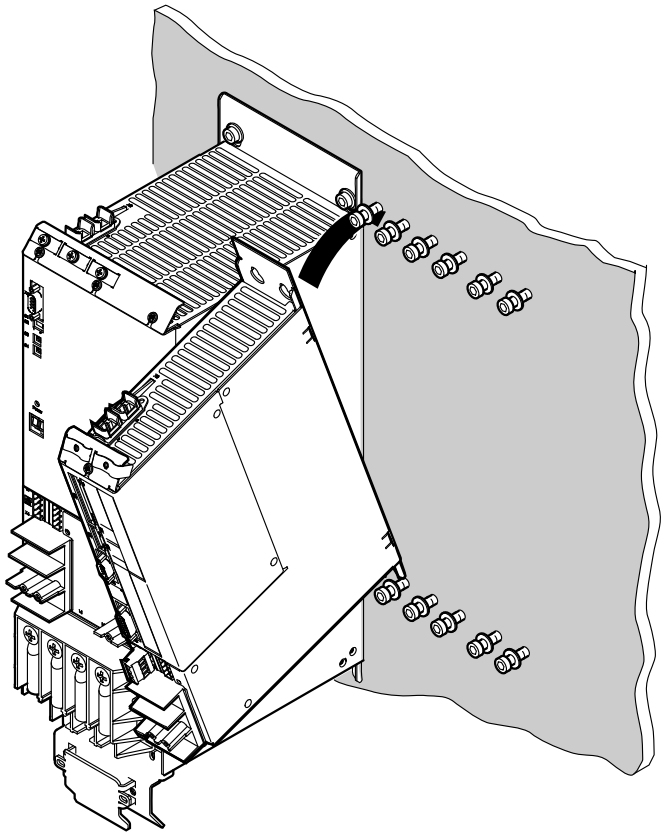
7.2.4 Installing an axis module

The item numbers in the following description refer to the figures shown in the previous chapter "Removing an axis module".

Mounting the axis module

- Place the axis module on the lower retaining screws from the top and push it backwards until its entire rear side touches the panel. Lower the axis module.



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Retaining screws

- Tighten the upper retaining screws **[7]**.
- Tighten the upper retaining screws **[9]**.

Brake control

- Plug in the brake control cables **[11]** (X6).

Motor lines

- Plug in the motor cables **[12]** (X2).

Shield plate

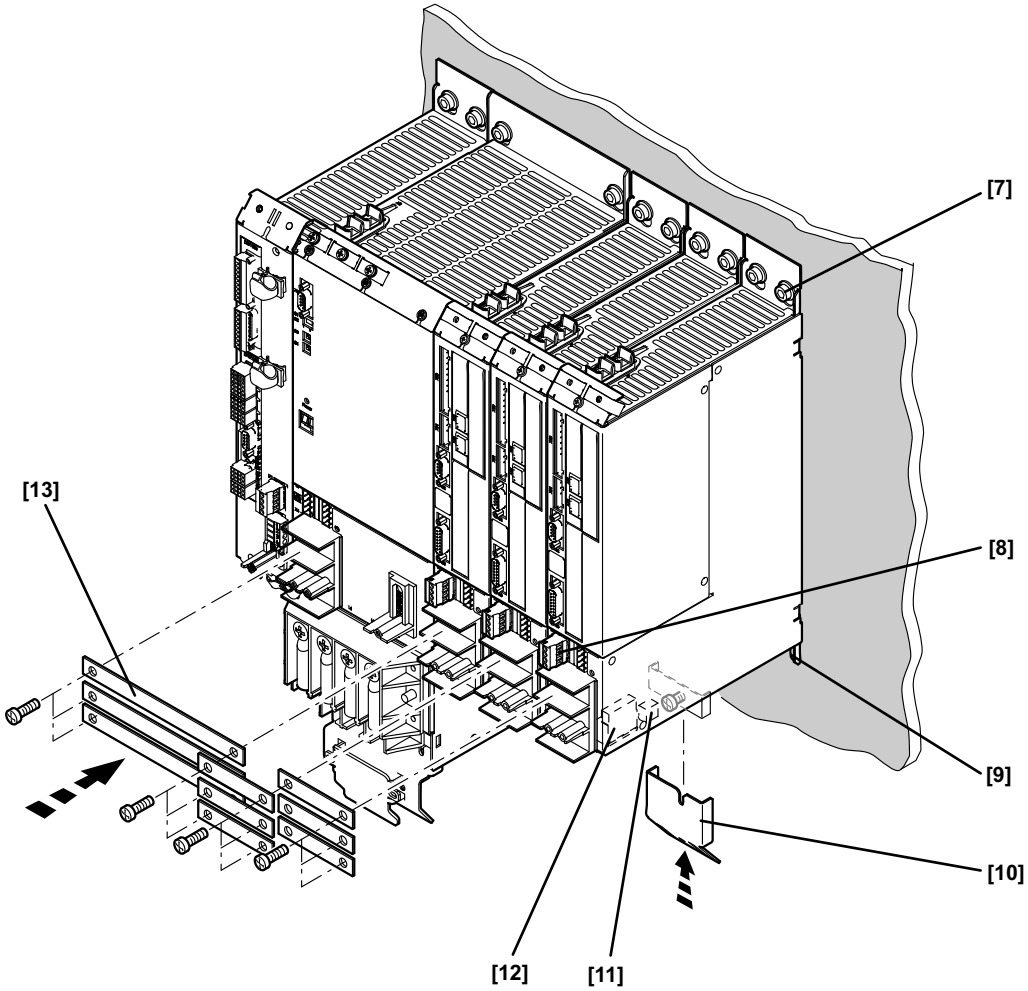
- Attach the shield plate on the power terminal **[10]**. Tighten the screws of the shield plate.

DC link bars

- Place on the DC link bars **[13]**. Tighten the screws of the bars (X4).

24 V cables

- Plug in the 24 V cable for the electronics and brake supply **[8]** (X5a, X5b).



Signal lines

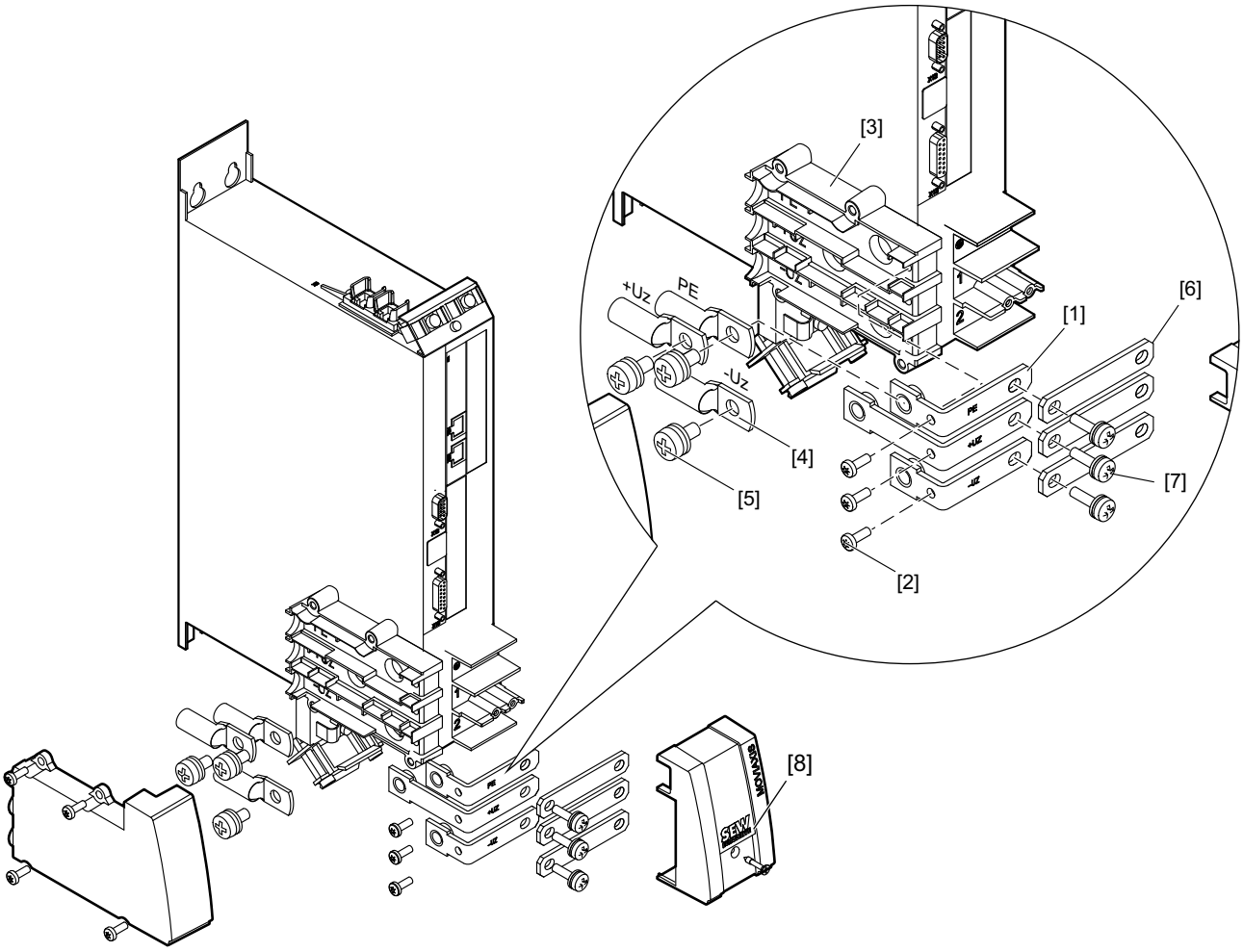
- Plug in the signal cables **[6]** (X10, X11) (page 225).

Covers

- Place on the protective covers **[5]** (page 225). Tighten the screws of the covers (page 225).

7.3 Mounting the DC link connection in case of two-row configuration of the axis system

We recommend the following sequence for mounting the DC link connection:



- Use the screws [2] to screw the three conductor bars [1] to the insulator [3]. The tightening torque is 2.5 – 3 Nm.

	INFORMATION
	The DC link conductors $+U_Z$ and $-U_Z$ must be twisted at least 3 times, see [1] in the figure on the next page.

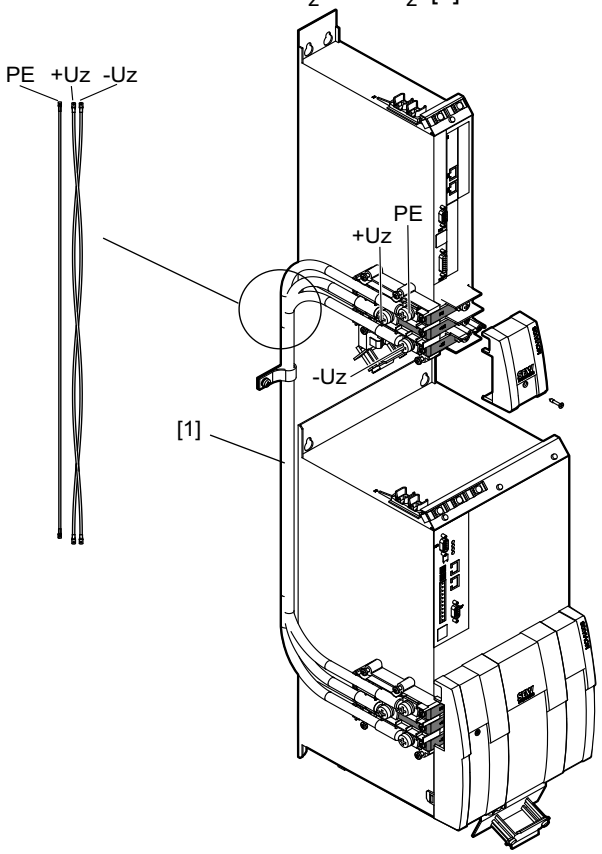
- Use the screws [5] to screw the three prefabricated DC link connections [4] to the conductor bars [1]. The tightening torque is 3 – 4 Nm.

The steps described above must be performed at both insulators.

Mount the preinstalled insulators to the axis module as follows:

- Push the conductor rails [1] **under** the DC link bars [6] of the axis module and use the screws [7] to connect them.
- Attach the protective cover [8].

Figure: Twisting the DC link connections $+U_Z$ and $-U_Z$ [1].



7.4 Extended storage

If the unit is stored for a long time, connect it to the mains voltage for at least 5 minutes every 2 years. Otherwise, the unit's service life may be reduced.

The 24V DC voltage supply can be applied without paying attention to any particular notes.

Procedure when maintenance has been neglected:

Electrolytic capacitors are used in the servo inverters. They are subject to aging effects when de-energized. This effect can damage the capacitors if the unit is connected using the nominal voltage after a longer period of storage.

If you have not performed maintenance regularly, SEW-EURODRIVE recommends that you increase the line voltage slowly up to the maximum voltage. This can be done, for example, by using a variable transformer for which the output voltage has been set according to the following overview. After you have completed the regeneration process, the unit can be used immediately or stored again.

The following stages are recommended:

AC 400/500 V units:

- Stage 1: 0 V to AC 350 V within a few seconds
- Stage 2: AC 350 V for 15 minutes
- Stage 2: AC 420 V for 15 minutes
- Stage 3: AC 500 V for 1 hour

After you have completed the regeneration process, the unit can be used immediately or stored again for an extended period with maintenance.

7.5 Disposal

Observe the applicable national regulations.

Dispose of the following materials separately in accordance with the country-specific regulations in force, such as:

- Electronics scrap (circuit boards)
- Plastics
- Sheet metal
- copper
- Aluminum.

8 Technical Data

8.1 CE marking and UL approval

The MOVIAXIS® MX multi-axis servo inverters comply with the following directives and guidelines:

8.1.1 CE-marking

- Low Voltage Directive 2006/95/EC.
- Electromagnetic Compatibility 2004/108/EC.

  MOVIAXIS® servo inverters and supply modules are designed as components for installation in machines and systems. They comply with the EMC product standard EN 61800-3 "Variable-speed electrical drives". Provided the installation instructions are complied with, they satisfy the relevant requirements for the CE marking for the entire machine/system in which they are installed, on the basis of the EMC Directive 2004/108/EC.
- Compliance with limit class "C2" according to EN 61800-3 has been tested on a specified test setup. SEW-EURODRIVE can provide detailed information on request.

CE

The CE mark on the nameplate indicates conformity with the Low Voltage Directive 2006/95/EC and the EMC Directive 2004/108/EC. We can provide a declaration of conformity on request.

8.1.2 Approvals of the basic units

The following approvals have been granted for the MOVIAXIS® modules:

MOVIAXIS® module	UL / cUL	c-Tick
MXP supply module 10 kW	x	x
MXP81 supply module 10 kW	x	x
MXP supply module 25 kW	x	x
MXP supply module 50 kW	x	x
MXP supply module 75 kW	x	x
MXR supply and regenerative module[1)]	x	x
MXA axis module	x	x
MXM master module	x	x
MXS 24 V switched-mode power supply module	x	x
MXB buffer module	x	x
MXC capacitor module	x	x
MXZ DC link discharge module	x	x
Two-row configuration of the axis system	x	x

1) For information on MXR, refer to the "Supply and Regenerative Module" manual

cUL is equivalent to CSA approval.

C-Tick certifies conformity with ACA (Australian Communications Authority) standards.

8.1.3 UL approval of the line components

NF.. line filter for MXP supply module

Independent of the MOVIAXIS® multi-axis servo inverter, the listed NF... line filters have a component approval.

- NF018-503
- NF048-503
- NF085-503
- NF150-503

ND.. line choke for MXP supply module

Independent of the MOVIAXIS® multi-axis servo inverter, the listed ND... line chokes have a component approval.

- ND020-013
- ND045-013
- ND085-013
- ND150-013

NFR.. line filters for MXR supply and regenerative module

Independent of the MOVIAXIS® multi-axis servo inverter, the listed NFR.. line filters have a component approval.

- NFR075-503
- NFR111-503

NFH.. line filters for MXR supply and regenerative module

In conjunction with the MXR units, the NFH line filter is a UL-listed accessory.

NDR.. line choke for MXR supply and regenerative module

Independent of the MOVIAXIS® multi-axis servo inverter, the listed NDR... line chokes have a component approval.

- NDR075-083
- NDR110-083

8.1.4 UL approval of two-row configuration of an axis module

The insulators have no UL approval.

The approval is currently in preparation.

8.2 General technical data

The following tables lists the technical data for all MOVIAXIS® MX multi-axis servo inverters independent of

- Type,
- Design,
- Size,
- And power

.

MOVIAXIS® MX	
Interference immunity	Meets EN 61800-3
Interference emission with EMC-compliant installation	Category "C2" according to 61800-3
Ambient temperature ϑ_U	0 °C to +45 °C
Climate class	EN 60721-3-3, class 3K3
Storage temperature ϑ_L	-25 °C to +70 °C
Storage life	Up to 2 years without special measures
Cooling type (DIN 41751)	Forced cooling and convection cooling, depending on size
Degree of protection EN 60529 (NEMA1)[1)]	
Axis module size 1 - 3	IP20
Axis module size 4 - 6	IP10
Power supply module size 1, 2	IP20
MXP81 supply module	IP20
Supply module size 3	IP10
MXR supply and regenerative module	IP10
Master module	IP20
Switched-mode power supply module	IP10
Capacitor module	IP10
Buffer module	IP10
DC link discharge module	IP10
Two-row configuration of the axis system	IP10
Duty type	DB (EN 60034-1)
Pollution class	2 according to IEC 60664-1 (VDE 0110-1)
Overvoltage category	III according to IEC 60664-1 (VDE 0110-1)
Installation altitude	Up to h ≤ 1000 m without restrictions. The following restrictions apply to heights > 1000 m: – From 1000 m to max. 2000 m: I_N reduction by 1% per 100 m

1) - The covers on the left and right end of the unit system must be equipped with touch guard covers. - All cable lugs must be insulated.

8.2.1 Suitability of standard binary inputs

	INFORMATION
	It is not permitted to control the standard binary inputs with safety-related (pulsed) voltages (except X7 and X8 at MXA).

8.3 Technical data of MXP supply modules

8.3.1 Power section supply module sizes 1 – 3

MOVIAXIS® supply module MXP80A-...-503-00	1)	2)	Size			
			1	2	3	
Type			010	025	050	075
INPUT						
Supply voltage AC V_{line}	U	V	3 × 380 V - 3 × 500 V ±10			
Nominal line current AC I_{line}	I	A	15	36	72	110
Nominal power P_N	P	kW	10	25	50	75
Line frequency f_{line}	f	Hz	50 - 60 ±5%			
Cross section and contacts on connections		mm^2	COMBICON PC4 pluggable, max. 4	COMBICON PC16 pluggable, max. 10	Screw bolt M8 max. 70	
Cross section and contacts on shield clamp		mm^2	max. 4 × 4	max. 4 × 10	max. 4 × 50 shielded	
OUTPUT (DC LINK)						
Nominal DC link voltage[3)]	U	V	DC 560			
Nominal DC link current[4)] DC I_{NZK}	I	A	18	45	90	135
Max. DC link current DC $I_{ZK\ max}$	I_{max}	A	45	112.5	225	337.5
Overload capacity for max. 1 s			250 %			
Brake chopper power		kW	Peak power: 250 % × P_N ; continuous power: 0.5 × P_N			
Mean regenerative power capacity		kW	0.5 x P_N			
Cross section[5)] and contacts		mm	CU bars 3 × 14 mm, M6 screw fitting			
BRAKING RESISTOR						
Minimum permitted braking resistor value R (4-Q operation)		Ω	26	10	5.3	3.5
Cross section and contacts on connections		mm^2	COMBICON PC4 pluggable, max. 4	COMBICON PC16 pluggable, max. 10	M6 screw bolts max. 35	
Cross section and contacts on shield clamp		mm^2	max. 4 × 4	max. 4 × 10	max. 4 × 16	

MOVIAXIS® supply module MXP80A-...-503-00		1)	2)	Size 1	2	3	
GENERAL INFORMATION							
Power loss at nominal capacity			W	30	80	160	280
No. of times power may be switched on/off			rpm	< 1/min			
Minimum switch-off time for power off			s	> 10			
Mass			kg	4.2	5.7	10.3	10.8
Dimensions:	W		mm	90	90	150	
	H		mm	300	400		
	D		mm	254			

1) Nameplate information

2) Unit

3) The system and output currents must be reduced by 20% from the nominal values for U_{NZK} = 3 × AC 500 V.

4) Decisive value for planning the assignment of supply and axis module

5) Material thickness [mm] × width [mm]

8.3.2 Power section of MXP81 compact supply module

The technical data of the MXP81 supply module with integrated braking resistor correspond to those of the supply module size 1. Deviating data is listed below:

MOVIAXIS® supply module MXP81A-...-503-00	1)	2)	Size 1
ADDITIONAL CAPACITY OF DC LINK			
Nominal DC link voltage	U	V	DC 560
Storable energy	W	Ws	250
Peak power capacity	P	kW	20
Nominal capacity	C	µF	1000
INTERNAL BRAKING RESISTOR			
Effective braking power	P_{eff}	W	220
Maximum braking power	P_{max}	kW	26
BRAKING RESISTOR (external)			
Minimum permitted braking resistor value R (4-Q operation)		Ω	26
Cross section and contacts on connections		mm^2	COMBICON PC4 pluggable, max. 4
Cross section and contacts on shield clamp		mm^2	max. 4 × 4
GENERAL INFORMATION			
Power loss at nominal capacity		W	30
Mass		kg	4.2
Dimensions: W		mm	120
Dimensions: H		mm	300
Dimensions: D		mm	254

1) Nameplate information

2) Unit

8.3.3 Control section of supply module

MOVIAXIS® MX supply module	General electronics data	
CAN interface[1)]	**CAN**: 9-pin D-sub connector	CAN bus to CAN specification 2.0, parts A and B, transmission technology to ISO 11898, max. 64 stations, Terminating resistor (120 Ω) has to be implemented externally, Baud rate can be set from 125 kbaud – 1Mbaud, Expanded MOVILINK® protocol,
DC 24 V voltage supply	DC 24 V ± 25 % (EN 61131)	
Cross section and contacts	COMBICON 5.08 One core per terminal: 0.20 - 1.5 mm^2 Two cores per terminal: 0.25 - 1.5 mm^2	
Switchover from SBus to SBus[plus]	DIP switch, 4-pole	
Shield clamps	Shield clamps for control lines available	
Maximum cable cross section that can be connected to the shield clamp	10 mm (with insulating sheath)	

1) Only for CAN-based system bus

8.4 Technical data of MXA axis modules

8.4.1 Axis module power section

MOVIAXIS® axis module MXA80A-...-503-00	1)	2)	Size									
			1			2		3		4	5	6
Type			002	004	008	012	016	024	032[6]	048	064	100
INPUT (DC link)												
Nominal DC link voltage U_{NZK}	U	V	DC 560									
Nominal DC link current I_{NZK}[3]	I	A	2	4	8	12	16	24	32	48	64	100
Cross section[4] and contacts		mm	CU bars 3 × 14, M6 screw fitting									
OUTPUT												
Output voltage U	U	V	0 – max. U_{line}									
Continuous output current AC I_N PWM = 4 kHz[5]	I	A	2	4	8	12	16	32	42[6]	64	85	133
Continuous output current AC I_N PWM = 8 kHz[5]	I	A	2	4	8	12	16	24	32	48	64	100
Continuous output current AC I_N PWM = 16 kHz[5]	I	A	1.5	3	5	8	11	13	18	-	-	-
Max. unit output current I_{max}[7]	I_{max}	A	5	10	20	30	40	60	80	120	160	250
Overload capacity for max. 1 s			250 %									
Apparent output power S_{Nout}[8]	S	kVA	1.4	2.8	5.5	8.5	11	17	22	33	44	69
PWM frequency f_{PWM}		kHz	optional: 4/8/16; Setting on delivery: f_{PWM} = 8 kHz									
Maximum output frequency f_{max}	f	Hz	600									
Cross section and contacts of motor connections		mm^2	COMBICON PC4 pluggable, max. 4					COMBICON PC16 pluggable, max. 10		Screw bolts M6 max. 35		Screw bolts M8 max. 70
Cross section and contacts on motor shield clamp		mm^2	max. 4 × 4					max. 4 × 10		max. 4 × 35		max. 4 × 50
Brake connection	U_{BR} / I_{BR}	V / A	1 binary output brake control			Suitable for direct operation of brake, short-circuit proof. External 24 V required. Tolerance depends on the used brake type, see project planning manual. **See example for maximum load below the footnotes.**						
			Signal level: "0" = 0 V "1" = +24 V **Important:** Do not apply external voltage!									
			Function: "/Brake" fixedly assigned									
Brake connection contacts			COMBICON 5.08									
		mm^2	One core per terminal: 0.20 – 1.5 mm^2 Two cores per terminal: 0.25 – 1.5 mm^2									
Shield clamps			Shield clamps for brake lines available									
Maximum cable cross section that can be connected to the shield clamp			10 mm (with insulating sheath)									

Table continued on next page. Footnotes on next page.

MOVIAXIS® axis module MXA80A-...-503-00	1)	2)	Size 1			2		3		4	5	6
GENERAL INFORMATION												
Power loss at nominal capacity		W	30	60	100	150	210	280	380	450	670	1100
Mass		kg	4.2	4.2	4.2	5.2	5.2	9.2	9.2	9.2	15.6	15.6
Dimensions: W		mm	60			90		90		120	150	210
Dimensions: H		mm	300			300		400		400	400	400
Dimensions: D		mm	254									

1) Nameplate information
2) Unit
3) with simplification: $I_{NZK} = I_N$ (typical motor application)
4) Material thickness [mm] × width [mm]
5) For V_{line} = 3 × AC 500 V, the output currents must be reduced by 20% from the nominal values
6) For a 32 A axis used in line with UL and with a PWM of 4 kHz, the maximum continuous output current is 35 A.
7) Indicated values apply to motor operation. Motor and regenerative have the same peak performance.
8) Applies to a line voltage of 400 V and 50 Hz / PWM = 8 kHz.

8.4.2 Notes on brake control

	INFORMATION
	Note on tolerance requirement for the brake voltage! The brake voltage has to be configured. See "MOVIAXIS® Multi-Axis Servo Inverter" system manual.

8.4.3 Permitted load of brake controller and brake

One complete switching sequence (opening and closing) must not be repeated more often than every two seconds. The brake must remain switched off for at least 100 ms before it can be switched on again.

8.4.4 Control section of axis module

MOVIAXIS® MX axis module	General electronics data	
DC 24 V voltage supply	DC 24 V ± 25 % (EN 61131)	
Cross section and contacts	COMBICON 5.08 One core per terminal: 0.20 - 1.5 mm² Two cores per terminal: 0.25 - 1.5 mm²	
X10:1 and X10:10 binary inputs **Internal resistance**	Isolated (optocoupler), PLC compatible (EN 61131), sampling interval 1 ms $R_i \approx 3.0\ k\Omega$, $I_I \approx 10\ mA$	
Signal level	+13 V - +30 V = "1" = contact closed -3 V - +5 V = "0" = contact open	according to EN 61131
Function	DIØØ: "Output stage enable" fixedly assigned DIØ1 - DIØ8: Selection option, see parameter menu DIØ1 and DIØ2 suitable for touch probe function (latency period < 100 µs)	
4 binary outputs	PLC compatible (EN 61131-2), response time 1 ms, short-circuit proof, I_{max} = 50 mA	
Signal level	"0"=0 V, "1"=+24 V, **Important: Do not apply external voltage.**	
Function	DOØØ - DOØ3: Selection option, see parameter menu	
Cross section and contacts	COMBICON 5.08 One core per terminal: 0.20 - 1.5 mm² Two cores per terminal: 0.25 - 1.5 mm²	
Shield clamps	Shield clamps for control lines available	
Maximum cable cross section that can be connected to the shield clamp	10 mm (with insulating sheath)	
X7 and X8: Connection contacts for safety functions	Safety relay integrated in unit as option	
	1 safety relays	2 safety relays
	• Category 3 according to EN 954-1:1996 • Performance level d according to EN ISO 13849-1:2006	• Category 4 according to EN 954-1:1996 • Performance level e according to EN ISO 13849-1:2006 • SIL3 according to IEC 61800-5-2:2007 • Protection type III according to EN 201:1997
Cross section and contacts	Mini COMBICON 3.5 One core per terminal: 0.08 - 1.5 mm² Two cores per terminal: 0.08 - 0.75 mm²	
CAN2 interface **(Front end CAN)**	CAN: 9-pin D-sub connector	CAN bus to CAN specification 2.0, parts A and B, transmission technology to ISO 11898, max. 64 stations,

8.5 Technical data of MXM master module component

MOVIAXIS® MX master module MXM80A-...-000-00 Type	1)	2)	Size 1 000
Supply voltage V	U	V	DC 24 V ± 25 % according to EN 61131
Cross section and contacts (X5a)	COMBICON 5.08 One core per terminal: 0.20 – 1.5 mm² Two cores per terminal: 0.25 – 1.5 mm²		
Cross section and contacts (X5b)	COMBICON 5.08 One core per terminal: 0.20 – 1.5 mm² Two cores per terminal: 0.25 – 1.5 mm² Maximum outer diameter of the cable: 3.5 mm. Recommended connector: MSTB 2.5/4-ST-5.08 BK (Phoenix) (COMBICON 5.08 with front-end cable output)		
GENERAL INFORMATION			
Mass		kg	2.3
Dimensions: W		mm	60
Dimensions: H		mm	300
Dimensions: D		mm	254
Shield clamps	Shield clamps for control lines available		
Maximum cable cross section that can be connected to the shield clamp	10 mm (with insulating sheath)		

1) Nameplate information

2) Unit

INFORMATION

For additional technical data, refer to the manuals "MOVI-PLC® *advanced* DH..41B Controller", "UFR41B Fieldbus Gateway for EtherNet/IP, Modbus/TCP and PROFINET IO", and "UFF41B Fieldbus Gateway for DeviceNet and PROFIBUS DP".

8.6 Technical data of MXC capacitor module component

MOVIAXIS® capacitor module MXC80A-050-503-00	1)	2)	
Type			050
INPUT			
Nominal DC link voltage U_{NZK}	U	V	DC 560
Storable energy[3]	W	Ws	1000
Peak power capacity		kW	50
Cross section and contacts		mm	CU bars 3 × 14, M6 screw fitting
GENERAL INFORMATION			
Capacity	C	µF	4920
Time from switching the unit on until it is ready for operation		s	10
Mass		kg	12.6
Dimensions: W		mm	150
Dimensions: H		mm	400
Dimensions: D		mm	254

1) Nameplate information

2) Unit

3) With V_{line} = 3 × AC 400 V

8.6.1 Control section of capacitor module

MOVIAXIS® MXC capacitor module	General electronics data
DC 24 V voltage supply	DC 24 V ± 25 % (EN 61131)
Cross section and contacts	COMBICON 5.08 One core per terminal: 0.20 – 1.5 mm² Two cores per terminal: 0.25 – 1.5 mm²

8.7 Technical data of MXB buffer module component

MOVIAXIS® buffer module MXB80A-050-503-00	1)	2)	
Type			050
INPUT			
Nominal DC link voltage[3] **$V_{DC\ link}$**	U	V	DC 560
Cross section and contacts		mm	CU bars 3 × 14, M6 screw fitting
GENERAL INFORMATION			
Capacity	C	µF	4920
Time from switching the unit on until it is ready for operation		s	10
Mass		kg	11
Dimensions: W		mm	150
Dimensions: H		mm	400
Dimensions: D		mm	254

1) Nameplate information

2) Unit

3) With V_{line} = 3 × AC 400 V

8.8 Technical data of MXS 24 V switched-mode power supply module component

MOVIAXIS® 24 V switched-mode power supply module MXS80A-...-503-00 Type	1)	2)	060
INPUT via DC link			
Nominal DC link voltage U_{NZK}	U	V	DC 560
Cross section[3] and contacts			CU bars 3 × 14, M6 screw fitting
INPUT via external 24 V			
Nominal input voltage U_N	U	V	DC 24 -0 % / +10 % - with direct brake control DC 24 ±25 % (EN 61131) - with brake control via brake switchgear
Cross section and contacts		mm^2	PC6 One core per terminal: 0.5 – 6 Two cores per terminal: 0.5 – 4
OUTPUT			
Nominal output voltage V	U	V	DC 3 x 24 (shared ground) Tolerance for supply via DC link: DC 24 0 % / +10 % tolerance for supply via external 24 V: According to input voltage
Nominal output current I	I	A	3 × 10 [4]
Nominal output power P	P	W	600
Cross section and contacts		mm^2	COMBICON 5.08 One core per terminal: 0.20 – 1.5 mm^2 Two cores per terminal: 0.25 – 1.5 mm^2
GENERAL INFORMATION			
Delay time for U_Z drop[5]	t	s	Nominal power for 10 ms
Efficiency			About 80%
Mass		kg	4.3
Dimensions W		mm	60
H		mm	300
D		mm	254

1) Nameplate information

2) Unit

3) Material thickness [mm] × width [mm]

4) Not possible at the same time because total power is limited to 600 W

5) Applies to the following test point: 10 ms are guaranteed for an edge steepness of the falling DC link voltage of (dU_{ZK} / dt) > (200 V / 1 ms). Applies for a line voltage U_{ZK} of 3 × AC 380 V.

8.9 Technical data of MXZ DC link discharge module component

8.9.1 Power section of DC link discharge module

MOVIAXIS® DC link discharge module MXZ80A-...-503-00 Type	1)	2)	Size 1 050
INPUT (DC link)			
Nominal DC link voltage[3]	U	V	DC 560
Cross section[4] **and contacts**			CU bars 3 × 14, M6 screw fitting
Convertible energy E	E	J	5000
OUTPUT			
Braking resistor R	R	Ω	1
Discharge connection			Specific screw fitting by SEW
Cross section and contacts		mm^2	M6 screw bolts, max. 4 × 35
Connection to power shield clamp		mm^2	max. 4 × 16
GENERAL INFORMATION			
Ready for operation after switching on the mains power and the 24 V supply		s	≤ 10
Ready for operation after short circuit		s	Depends on application
Repeatability of quick discharge		s	60
Duration of quick discharge		s	≤ 1
Shutdown temperature		°C	70
Mass		kg	3.8
Dimensions: W		mm	120
Dimensions: H		mm	235
Dimensions: D		mm	254

1) Nameplate information

2) Unit

3) The line and output currents must be reduced by 20% from the nominal values for V_{line} = 3 × AC 500 V U_{NZK}

4) Material thickness [mm] × width [mm]

8.9.2 Control section of DC link discharge module

MOVIAXIS® DC link discharge module	1)	General electronics data
Inhibit		Control signal for discharge process (low active)
DC 24 V voltage supply	V	DC 24 ± 25% (EN 61131-2)
Cross section and contacts	mm^2	COMBICON 5.08 One core per terminal: 0.20 – 1.5 mm^2 Two cores per terminal: 0.25 – 1.5 mm^2
Temp.		Evaluation signal for connection to an axis module (connection to binary inputs); switching current ≤ 50 mA

1) Unit

8.10 Technical data of two-row configuration of the axis system

The following table lists only the data that deviates from the technical data listed above due to two-row configuration.

MOVIAXIS® MX	
Degree of protection EN 60529	IP10
Connection cross section of the DC link connection	35 mm^2
Screw fitting at cable lug	M8
Tightening torques	
Retaining screws of the cover	2.5 – 3 Nm
Retaining screws of conductor bars at insulator	2.5 – 3 Nm
Retaining screws of the DC link connections	3 – 4 Nm

8.11 Technical data of 24 V current consumption

The current consumption of the MOVIAXIS® units and their options depends on the switch-on time. It is therefore not possible to specify the current consumption explicitly, but it must be projected in relation to the switch-on time.

For more information on this, refer to the "MOVIAXIS® Multi-Axis Servo Inverter" system manual.

8.12 Technical data of braking resistors

8.12.1 UL and cUL approval

BW... type braking resistors are UL and cUL approved in conjunction with the MOVIAXIS® multi-axis servo inverter. SEW-EURODRIVE will provide certification on request.

The following braking resistors have cRUus approval independent of the MOVIAXIS® multi-axis servo inverter:

- BW012-015-01
- BW006-025-01
- BW006-050-01
- BW004-050-01

SEW-EURODRIVE will provide certification on request.

8.12.2 Technical data

Braking resistor type	1)	BW027-006	BW027-012	BW247	BW247-T	BW347	BW347-T	BW039-050
Part number		822 4226	822 4234	820 7143	1820 0842	820 798 4	1820 1350	821 691 6
Power class of the supply module	kW	10, 25, 50, 75						
Load capacity 100% cdf[2)]	kW	0.6	1.2	2		4		5
Resistance value R_{BW}	Ω	27 ±10 %		47 ±10 %				39 ±10 %
Trip current (of F16) I_F	A_{RMS}	4.7	6.7	6.5		9.2		11.3
Design		Wire resistor						Grid resistor
Connections	mm^2	Ceramic terminals 2.5						
Permitted electric loading of the terminals at 100% cdf	A	DC 20						
Permitted electric loading of the terminals at 40 % cdf	A	DC 25						
Amount of energy that can be absorbed	kWs	10	28	64		84		600
Degree of protection		IP20 (when installed)						
Ambient temperature ϑ_U	°C	-20 to +45						
Type of cooling		KS = self-cooling						

1) Unit

2) cdf = Cyclic duration factor of the braking resistor in relation to a cycle duration $T_D \leq 120$ s

Braking resistor type	1)	BW012-015	BW012-015-01[2]	BW012-025	BW12-025-P	BW012-050	BW012-100-T	BW915-T
Part number		821 679 7	1 820 010 9	821 680 0	1820 4147	821 681 9	1820 1415	1820 4139
Power class of the supply module	kW	25, 50, 75						
Load capacity 100% cdf[3]	kW	1.5	1.5	2.5		5.0	10	16
Resistance value R_{BW}	Ω	12 ±10 %						15 ±10 %
Trip current (of F16) I_F	A_{RMS}	11.2	11.2	14.4		20.4	28.8	31.6
Design		Wire resistor	Grid resistor					
Connections	mm^2	Ceramic terminals 2.5						
Permitted electric loading of the terminals at 100% cdf	A	DC 20						
Permitted electric loading of the terminals at 40 % cdf	A	DC 25						
Amount of energy that can be absorbed	kWs	34	240	360		600	1260	1920
Degree of protection		IP20 (when installed)						
Ambient temperature ϑ_U	°C	-20 to +45						
Type of cooling		KS = self-cooling						

1) Unit

2) Braking resistors have a 1 Ω tap

3) cdf = Cyclic duration factor of the braking resistor in relation to a cycle duration $T_D \leq 120$ s

Braking resistor type	1)	BW006-025-01[2]	BW006-050-01	BW106-T	BW206-T	BW004-050-01
Part number		1 820 011 7	1 820 012 5	1820 0834	1820 4120	1 820 0133
Power class of the supply module	kW	50, 75				75
Load capacity 100% cdf[3]	kW	2.5	5.0	13	18	5.0
Resistance value R_{BW}	Ω	5.8 ±10 %		6 ±10 %		3.6 ±10 %
Trip current (of F16) I_F	A_{RMS}	20.8	29.4	46.5	54.7	37.3
Design		Grid resistor				
Connections		M8 stud				
Permitted electric loading of the terminal stud at 100% cdf	A	DC 115				
Permitted electric loading of the terminal stud at 40% cdf	A	DC 143				
Amount of energy that can be absorbed	kWs	300	600	1620	2160	600
Degree of protection		IP20 (when installed)				
Ambient temperature ϑ_U	°C	-20 to +45				
Type of cooling		KS = self-cooling				

1) Unit

2) Braking resistors have a 1 Ω tap

3) cdf = Cyclic duration factor of the braking resistor in relation to a cycle duration $T_D \leq 120$ s

8.13 Technical data of line filter option for supply module

- To suppress interference emission on the line side of inverters.
- Do not switch between the NF... line filter and MOVIAXIS®.
- NF.. line filters have cRUus approval independent of MOVIAXIS®.

Line filter type	NF018-503	NF048-503	NF085-503	NF150-503
Part number	827 413 4	827 117 8	827 415 0	827 417 7
Supply module	Size 1	Size 2	Size 3	Size 3
Rated line voltage (V_{line}) (according to EN 50160)	3 × AC 380 V - 500 V, 50/60 Hz			
Nominal current (I_N)	AC 18 A	AC 48 A	AC 85 A	AC 150 A
Power loss at I_N (P_V)	12 W	22 W	35 W	90 W
Earth-leakage current at (V_N)	< 25 mA	< 40 mA	< 30 mA	< 30 mA
Ambient temperature (ϑ_U)	-25 – +40 °C			
Degree of protection	IP20 (EN 60529)			
Connections L1-L3/L1'-L3' **Tightening torque L1-L3/L1'-L3'** **Connection PE** **Tightening torque PE**	4 mm^2 (AWG 10) 0.8 Nm M5 stud 3.4 Nm	10 mm^2 (AWG 8) 1.8 Nm M6 stud 5.5 Nm	35 mm^2 (AWG 2) 3.7 Nm M8 12.8 Nm	50 mm^2 (AWG1/0) 3.7 Nm M10 23.8 Nm

8.14 Technical data of line choke option for supply module

Using line chokes is optional:

- To support overvoltage protection
- To smoothen the line current, to reduce harmonics
- Protection in the event of distorted line voltage
- To limit the charging current when several inverters are connected together in parallel on the input end with shared line contactors (nominal current of line choke = total of inverter currents).

ND.. line chokes have cRUs approval independent of the MOVIAXIS®.

Line choke type		ND020-013	ND045-013	ND085-013	ND150-013
Part number		826 012 5	826 013 3	826 014 1	825 548 2
Supply module		Size 1	Size 2	Size 3	Size 3
Rated line voltage (according to EN 50160)	V_{line}	3 × AC 380 V - 500 V, 50/60 Hz			
Nominal current	I_N	AC 20 A	AC 45 A	AC 85 A	AC 150 A
Power loss at I_N	P_V	10 W	15 W	25 W	65 W
Inductance	L_N	0.1 mH	0.1 mH	0.1 mH	0.1 mH
Ambient temperature	ϑ_U	-25 – +45 °C			
Degree of protection		IP00 (EN 60529)			
Connections L1-L3/L1'-L3'		Terminal strips 4 mm² (AWG12)	Terminal strips 10 mm² (AWG8)	Terminal strips 35 mm² (AWG2)	M10 stud
PE					PE: M8 stud
Tightening torque		0.6 – 0.8 Nm	Max. 2.5 Nm	3.2 – 3.7 Nm	M10 stud: 10 Nm PE: 6 Nm

8.15 Safety technology (safe stop)

INFORMATION

It is essential to observe the information on this topic in the following publications:

- MOVIAXIS® MX – Functional Safety

8.16 Technical data of the multi-encoder card option XGH11A, XGS11A

XGH, XGS multi-encoder card	1)	
Power consumption via integrated supply bus (without connected encoder)	W	2
Output current for supplying connected encoders	mA	500
Peak output current I_{max} for 400 ms	mA	650
Setting the emulation source	2)	64/128/256/512/1024/2048/4096
Cable length	m	100 with a capacitance per unit length of 120 nF/km
Short-circuit proof		Yes
Technical data of X61		
Tolerance	V	± 10
Resolution	Bit	12
Update interval	µs	250
Can be used as		n or M setpoint input
		General input for measured values
		Torque limit value
Technical data of X62		
Interface		RS422
Maximum frequency	kHz	200
Characteristics		Simulation output is based on the motor or option encoder, can be selected via unit parameters
		PPR count can be freely selected in powers of two from 2^6 – 2^{12}
		Encoder signals can be multiplied
The maximum possible speed depends on the emulation PPR count set	min^{-1}	**PPR count setmax. possible speed** 64 – 1024 no limit 2048 5221 4096 2610

1) Unit

2) Increments per revolution

8.17 Technical data of XFP11A communication option

8.17.1 Description

The XFP11A communication module is a PROFIBUS slave module for direct integration into MOVIAXIS® axis modules. The XFP11A PROFIBUS card is used for directly connecting axis modules to PROFIBUS-capable control systems. Only one XFP11A PROFIBUS card can be installed per axis module.

XFP11A option	
Part number	1820 4341
Power consumption	P = 2.5 W
PROFIBUS protocol variants	PROFIBUS DP and DP-V1 to IEC 61158
Automatic baud rate detection	9.6 kBd – 12 MBd
Connection technology	• Via 9-pin D-sub connector • Pin assignment acc. to IEC 61158
Bus termination	Not integrated, implement using suitable PROFIBUS plug with terminating resistors that can be switched on.
Station address	0 – 125, can be set via DIP switch
Name of GSD file	• SEW_6006.GSD (PROFIBUS DP) • SEWA6003.GSD (PROFIBUS DP-V1)
DP ID number	$6006_{hex} = 24582_{dec}$
Application-specific parameterization data (Set-Prm-UserData)	• Length: 9 bytes • Hex parameter settings 00,00,00,06,81,00,00,01,**01** = DP diagnostics alarm = **OFF** • Hex parameter settings 00,00,00,06,81,00,00,01,**00** = DP diagnostics alarm = **ON**
Diagnostics data	• Standard diagnostics: 6 bytes
Tools for startup	• PC program MOVITOOLS® MotionStudio

8.18 Technical data of EtherCAT® fieldbus interface option

8.18.1 Description of XFE24A

The XFE24A fieldbus interface is a slave module for connection to EtherCAT® networks. Only one XFE24A fieldbus interface can be installed per axis module. The XFE24A fieldbus interface allows MOVIAXIS® to communicate with all EtherCAT® master systems. All standards of the ETG (EtherCAT® Technology Group) are supported, such as wiring. This means the cables must be wired at the front by the customer.

XFE24A option (MOVIAXIS®)	
Standards	IEC 61158, IEC 61784-2
Baud rate	100 MBd full duplex
Connection technology	2 × RJ45 (8x8 modular jack)
Bus termination	Not integrated because bus termination is automatically activated.
OSI layer	Ethernet II
Station address	Setting via EtherCAT® master
Vendor ID	0x59 (CANopenVendor ID)
EtherCAT® services	• CoE (CANopen over EtherCAT®) • VoE (simple MOVILINK® protocol or EtherCAT®)
Firmware status of MOVIAXIS®	Firmware status 21 or higher
Tools for startup	• PC program MOVITOOLS® MotionStudio from version 5.40

8.18.2 Description of XSE24A

You find a description of the option XSE24A – EtherCAT® compatible system bus SBus^{plus} in chapter "Installation" (page 113).

8.19 Technical data of K-Net communication option

8.19.1 Description

The XFA11A (K-Net) communication module is a slave module for connection to a serial bus system for high-speed data transfer. No more than one XFA11A (K-Net) communication module may be installed per MOVIAXIS® MXA axis module.

Terminal assignment

	Terminal	Assignment	Brief description
	X31:		K-Net connection (RJ-45 socket)
	X32:		K-Net connection (RJ-45 socket)

INFORMATION

You can select either connector X31 or X32 as input or output.

Technical data

K-Net	
Power consumption	2 W
Electrical isolation	No
Bus bandwidth	Max. 50 Mbit/s
Connection technology	2xRJ-45
Max. cable length per section	50 m
Transmission medium	CAT7 cable

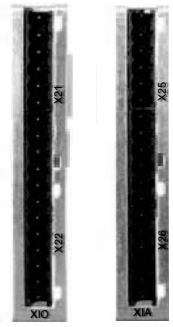
Interfaces	K-Net: Front
K-Net properties	Serial bus
	No electrical isolation
	Bus bandwidth with max. 50 Mbit/s
	Connection technology with two RJ-45 sockets
	Transmission medium CAT7 cable
Card properties	Installation in MOVIAXIS® MX servo inverter with housing widths as of 60 mm

INFORMATION

The power and current data refer to DC 24 V. The losses of the internal switched-mode power supply units have been taken into account.

8.20 Technical data of XIO11A, XIA11A input/output option

8.20.1 Description



The input/output modules XIO11A/XIA11A are digital or digital/analog hybrid option modules. They can be used to read or send both digital and analog signals from the servo inverter.

8.20.2 Binary hybrid module XIO11A

General information	
Supply voltage	DC 24 V ± 25%, 4 A[1] (EN 61131-1)
Supply of IOs	from the front
Addressing	via 16-digit address switch (positions 1 and 3 only)
Connection contacts	COMBICON 5.08 One core per terminal: 0.20 – 2.5 mm^2 Two cores per terminal: 0.25 – 1 mm^2
Inverter power consumption	0.6 W
Binary inputs	
Number of inputs	8
Input type	Type 1 according to EN 61131-2
Filter	500 Hz
Voltage range for "1"	15 V ≤ UH ≤ 30 V
Voltage range for "0"	-3 V ≤ UL ≤ 5 V
Processing time	1 ms
Electrical isolation	Yes
Binary outputs	
Number of outputs	8
Output type	Binary outputs according to EN 61131-2
Nominal voltage	DC 24 V
Processing time	1 ms
Nominal current	0.5 A
Power loss	0.1 W with nominal current ($R_{on\ max}$: 400 mΩ)
Inductive load capacity	100 mJ at max. 1 Hz
Protection device	Short circuit and overload protection
Electrical isolation	Yes

1) Maximum current of 4 A must be fused externally.

8.20.3 XIA11A analog/binary hybrid module

General	
Supply voltage	DC 24 V ± 25 %, 2 A (EN 61131-1)
Supply of IOs	from the front
Addressing	via 16-digit address switch (positions 1 and 3 only)
Connection contacts	COMBICON 5.08 One core per terminal: 0.20 – 2.5 mm^2 Two cores per terminal: 0.25 – 1 mm^2
Inverter power consumption	0.7 W
Analog inputs	
Number of inputs	2
Input range	±10 V
Input type	differential
Conversion cycle	1 ms
Resolution	12 bit
Electrical isolation	No
Maximum permitted permanent overload	+30 V against GND
Input impedance	> 20 kΩ (EN 61131)
Accuracy (at 25 °C)	± 0.2 %
Measuring error temperature coefficient	100 ppm SKE[1)]/ °C
Input filter limit frequency	250 Hz
Analog outputs	
Number of outputs	2
Output range	±10 V
Conversion cycle	1 ms
Resolution	12 bit
Electrical isolation	No
Output load	Min. 1 kΩ
Accuracy (at 25 °C)	± 0.1 %
Measuring error temperature coefficient	100 ppm SKE[1)]/ °C
Minimum rise time (0 – 10 V)	100 µs
Binary inputs	
Number of inputs	4
Input type	Type 1 according to EN 61131-2
Filter	500 Hz
Voltage range for "1"	15 V ≤ UH ≤ 30 V
Voltage range for "0"	-3 V ≤ UL ≤ 5 V
Processing time	1 ms
Electrical isolation	Yes

Table continued on next page. Footnotes on next page.

Binary outputs	
Number of outputs	4
Output type	Binary outputs according to EN 61131-2
Nominal voltage	DC 24 V
Processing time	1 ms
Nominal current	0.5 A
Power loss	0.1 W with nominal current ($R_{on\ max}$: 400 mΩ)
Inductive load capacity	100 mJ at max. 1 Hz
Protection device	Short circuit and overload protection
Electrical isolation	Yes

1) SKE = maximum scale value

9 Appendix

9.1 Suitable encoders

The encoders listed in the following tables are evaluated by the multi-encoder card.

SEW encoder designation	Encoder system	Manufacturer designation/manufacturer	Encoder voltage supply
AF1H	Hiperface®	SRM50-HZA0-S05 / SICK-Stegmann	12 V
AG7W		AMG38W / Hübner	7 – 30 V
AK0H		SKM36 / SICK-Stegmann	12 V
AK1H		SRM50-HFA0-K22 / SICK-Stegmann	12 V
AL1H		L230 / SICK-Stegmann	12 V
AS1H		SRM50 / SICK-Stegmann	12 V
AS3H / AS4H		SRM64 / SICK-Stegmann	12 V
AS7H		SRM64 / SICK-Stegmann	12 V
AS7W		AMG73 W29 S2048 / Hübner	7 – 30 V
AV1H		SRM50C3 / SICK-Stegmann	12 V
AV6H		SRM50-HWZ0-S02 / SICK-Stegmann	12 V
AV7W		AMG73 W29 S2048	7 – 30 V
EF1H		SR50-HZA0-S03 / SICK-Stegmann	12 V
EK0H		SKS36 / SICK-Stegmann	12 V
EK1H		SICK-Stegmann	12 V
ES1H		SRS50 / SICK-Stegmann	12 V
ES2H		SICK-Stegmann	12 V
ES3H/ES4H		SRS64 / SICK-Stegmann	12 V
ES7H		SRS64 / SICK-Stegmann	12 V
EV1H		SRS50 C16	12 V
AG7Y	SSI	AMG83 SSI-Kombi / Hübner	7 – 30 V
AH7Y		HMG161 / Hübner	24 V
AS7Y		AMG73 S24 S2048 / Hübner	7 – 30 V
AV1Y		ROQ424SSI / Heidenhain	10 – 30 V
AV2Y		AVM58X / Pepperl & Fuchs	9 – 30 V
AV7Y		AMG73 S24 S2048 SSI-Kombi / Hübner	7 – 30 V
EG7S	Sin/cos	OG83 SN 10247 / Hübner	7 – 30 V
EH1S		HOG74-DN1024R / Hübner	12 V
EH7S		8.AH02H.5192.1024 / Kübler	10 – 30 V
ES1S		OG72S-DN1024R / Hübner	24 V
ES2S		OG72S-DN1024R / Hübner	24 V
ES7S		OG73 SN 1024 / Hübner	7 – 30 V
EV1S		ROD486 1024 / Heidenhain	24 V
EV2S		OG71S-DN1024R / Hübner	24 V
EV7S		OG73 SN 1024 / Hübner	7 – 30 V

SEW encoder designation	Encoder system	Manufacturer designation/manufacturer	Encoder voltage supply
EG7R	TTL	OG83 RN 1024	7 – 30 V
EG7T		SEW	5 V
EH1R		HOG74-DN1024R / Hübner	24 V
EH1T		HOG74-DN1024TTL / Hübner	12 V
EH7R		8.A02H.5142.1024 / Kübler	12 V
EH7T		8.A02H.5112.1024 / Kübler	5 V
ES1R		OG72-DN1024R / Hübner	24 V
ES1T		OG72-DN1024TTL / Hübner	5 V[1)]
ES2R		OG72-DN1024R / Hübner	24 V
ES2T		OG72-DN1024TTL / Hübner	5 V[1)]
ES7R		OG73 RN1024	7 – 30 V
EV1R:		ROD466 1024 / Heidenhain	10 – 30 V
EV1T		ROD426 1024 / Heidenhain	5 V
EV2R		OG71-DN 1024R / Hübner	24 V
EV2T		OG71-DN 1024TTL / Hübner	5 V[1)]
EV7R		OG73 RN 1024	7 – 30 V
EG7C	HTL	OG83 UN 1024 / Hübner	9 – 30 V
EH1C		HOG 74 DN 1024 / Hübner	12 V
EH7C		8.A02H.5132.1024 / Kübler	12 V
EI71		SEW	9 – 30 V
EI72		SEW	9 – 30 V
EI76		SEW	9 – 30 V
EI7C		SEW	9 – 30 V
ES7C		OG73 UN 1024 / Hübner	9 – 30 V
EV1C		ROD436 1024 / Heidenhain	10 – 30 V
EV2C		OG71 DN 1024 / Hübner	9 – 30 V
EV7C		OG73 UN 1024 / Hübner	9 – 30 V
RH1L	Resolver	Tyco Harowe	12 V
RH1M			12 V

1) Can only be used with option DWI11A

Encoder system	Manufacturer designation/manufacturer	Encoder voltage supply
SSI	BTL5-S112-M1500-P-S32 / Balluf	24 V
	BTL5-S112B-Mxxxx-P-xxx / Balluf	24 V
	AMS 200/200 / Leuze	24 V
	AMS 304i-xxx / Leuze	24 V
	OMS1 / Leuze	24 V
	WCS2 LS 311 / Pepperl & Fuchs	24 V
	DME 3000-111 / SICK	24 V
	DME 4000-xx1 / SICK	24 V
	DME 5000-111 / SICK	24 V
	AG626 / Stegmann	10 – 32 V
	LE100 / T&R	24 V
	LE200 / T&R	24 V
	EDM / Visolux	24 V
	OMS2 / Leuze	24 V
	WCS2A-LS311, WCS3-LS311 / Pepperl & Fuchs	24 V
	AMG73 S24 S2048 / Hübner	7 – 30 V
	AMG83 S24 S2048 / Hübner	7 – 30 V
	ARS60 / SICK-Stegmann	10 – 32 V
	ATM60/90 / SICK-Stegmann	10 – 32 V
	ARS60 / SICK-Stegmann	10 – 32 V
	AVM58X-1212 SSI-Kombi / Pepperl & Fuchs	9 – 30 V
	BPS37 / Leuze	10 – 30 V
	CE58 / T&R	12 V
	CE65 / T&R	12 V
	HMG161 S24 H2048	24 V
	Kueb 9081 xxxx2004	5 – 32 V
	LIMAX2 / Elgo	10 – 30 V
	MSA1000 / SiKO	24 V
	OLM100-1001 / SICK	10 – 30 V
	PCV80S-F200-SSI / Pepperl & Fuchs	24 V
	POMUX KH53 / SICK-Stegmann	10 – 32 V
	RD4 / MTS Sensors	24 V
	RF / MTS Sensors	24 V
	RH / MTS Sensors	24 V
	RP / MTS Sensors	24 V
	ROQ424 SSI-Kombi / Heidenhain	10 – 30 V
	ROQ425 ATEX / Heidenhain	5 V
	VDM100-150 / Pepperl & Fuchs	24 V
	WCS2(A)-LS311 / Pepperl & Fuchs	24 V
	WCS3(A)-LS311 / Pepperl & Fuchs	24 V
	WCS3B-LS311 / Pepperl & Fuchs	24 V
	GM401 / IVO	10 – 30 V

Encoder system	Manufacturer designation/manufacturer	Encoder voltage supply
SSI	AG100 MSSI / Stegmann	10 – 32 V
	LA 41K / T&R	24 V
	Kueb 9081xxxx2003	5 – 32 V
EnDat	ECN113 / Heidenhain	5 V
	ECN1313 / Heidenhain	12 V
	EQN1125 / Heidenhain	12 V
	EQN1325 / Heidenhain	12 V
	EQN425 / Heidenhain	5 V
	ROQ425 / Heidenhain	12 V
	ROQ425 ATEX / Heidenhain	5 V
Hiperface®	DME4000-xx7 / SICK	24 V
	DME5000-xx7 / SICK	24 V
	LinCoder L230	12 V
	SKM 36 / SICK-Stegmann	12 V
	SKS 36 / SICK-Stegmann	12 V
	SRM 50 / SICK-Stegmann	12 V
	SRM 60 / SICK-Stegmann	12 V
	SRM 64 / SICK-Stegmann	12 V
	SRS 50 / SICK-Stegmann	12 V
	SRS 60 / SICK-Stegmann	12 V
	SRS 64 / SICK-Stegmann	12 V

9.1.1 Encoder parameterization

The following points must be observed in the design and construction of encoders and when setting their parameters:

- **HEIDENHAIN ROQ 424 (AV1Y)**

  The SSI version with 10 ... 30 V is supported. The type designation specifies all additional conditions.

- **T&R CE 58, CE 65, LE 100 SSI, LE 200, LA 41K-SSI**
  - Make a setting of 24 data bits and program signal bits to logical 0. Bit no. 25 may either contain 0 or an error or power fail bit. Other special bits following the position will not be evaluated. The 25-bit version is not supported.
  - The output mode must be "Direct".
  - The interface must be set to "SSI".

- **SICK STEGMANN AG100 MSSI, AG626, ATM90, ATM60**

  Only the 24-bit version is supported.

- **SICK STEGMANN ARS60**

  Only the 15-bit version is supported.

- **SICK DME-5000-x111, DME-4000-x111**
  - The interface must be set to "SSI".
  - You have to set "24 data bits + error bit".
  - The resolution must be set to 0.1 mm or 1 mm.
  - The plausibility must be set to "Normal".

- **SICK DME-5000-x17, DME-4000-x17**
  - The interface must be set to "Hiperface®".
  - Set the resolution to 1 mm.
  - The plausibility must be set to "Normal".

- **SICK DME-4000-x19**
  - The interface must be set to "CANopen".
  - The node ID must be set to 1.
  - The resolution must be set to 0.1 mm or 1 mm.
  - The plausibility must be set to "Normal".

- **Pepperl & Fuchs WCS2(A)-LS311, WCS3(A)-LS311**

  The type designation specifies all necessary conditions. The line length to the encoder is not to exceed 10 m (33 ft.).

- **Pepperl & Fuchs WCS3B-LS410**
  - The node ID must be set to 1 (switches 1 – 6 of the 8-fold DIP switch)
  - The baud rate must be set to 250 kBd (switches 6 – 7 of the 8-fold DIP switch)
  - The transmission mode must be set to "asynchronous 0 ms / 10 ms" (switches 1 – 3 of the 4-fold DIP switch)
  - The data protocol must be set to "data protocol 2" (switch 4 of the 4-fold DIP switch to "on")

- **Pepperl & Fuchs VDM 100-150**
  - The operating mode must be set to mode 3 ([Menu] / [Parameters] / [operating modes] / [Mode 3]).
  - The coding must be set to "Gray".
  - The resolution must be set to 0.1 mm or 1 mm.

- **LEUZE AMS200, OMS1, OMS2, BPS37**
  - You have to set "24 data bits + error bit".
  - Set the resolution to 0.1 mm.

	INFORMATION
	The following applies for all parameterizable SSI encoders: – The interface must be set to "SSI". – You have to set "24 data bits + error bit" or "0 in bit 25". – Plausibility must be set to "normal = 0" when the plausibility check is activated. – The coding must be set to "Gray".

9.2 Cable dimensions to AWG

AWG stands for **A**merican **W**ire **G**auge and refers to the size of the wires. This number specifies the diameter or cross section of a wire in code. This type of cable designation is usually only used in the USA. However, the designations can also be seen in catalogs or data sheets in Europe.

AWG designation	Cross section in mm^2
000000 (6/0)	185
00000 (5/0)	150
0000 (4/0)	120
000 (3/0)	90
00 (2/0)	70
0 (1/0)	50
1	50
2	35
3	25
4	25
5	16
6	16
7	10
8	10
9	6
10	6
11	4
12	4
13	2.5
14	2.5
15	2.5
16	1.5
16	1
18	1
19	0.75
20	0.5
21	0.5
22	0.34
23	0.25
24	0.2

9.3 List of abbreviations

Abbreviation	Definition	Meaning
BGND		Reference potential for brake connection
CAN	**C**ontroller **A**rea **N**etwork	
CCU	**C**onfigurable **C**ontrol **U**nit	
DCOM		Reference potential for binary inputs
DGND PE		General reference potential of control electronics. There is a metallic connection to PE.
DI	**D**igital **I**n	
DIN	**D**eutsches **I**nstitut für **N**ormung e.V. (German institute for standardization)	
DIN EN	EN European Standard whose German version has the status of a German standard.	
DIN EN ISO	ISO standard that has been made a European standard and has been adopted into the German book of standards.	
DIN IEC	International standard that has been adopted without changes into the German standard.	
DO	**D**igital **O**ut	
EN	**E**uropäische **N**orm (European standard)	
FCB	**F**unction **C**ontrol **B**lock	Modular firmware structure
FS	**F**unctional **S**afety	The safety functions offered by the unit
GND	**G**rou**nd**	
HTL	**H**igh-voltage **T**ransistor-**L**ogics	
IP	**I**nternational **P**rotection = international type of enclosure	
ISO	**I**nternational **O**rganisation for **S**tandardization	The ISO creates ISO standards that should be adopted unrevised by the member states.
PDO	**P**rocess **D**ata **O**bject	Process data
PE	**P**rotected **E**arth: Equipment grounding conductor	Ground connection
PELV	**P**rotective **E**xtra **L**ow **V**oltage	Extra-low voltage
PWM	**P**ulse**W**idth **M**odulation	
RGND		Reference potential for safety relay
SELV	**S**afety **E**xtra **L**ow **V**oltage	
SS1 / SS2	**S**afe **S**top **1** / **S**afe **S**top **2**	Safe Stop 1 / 2
STO	**S**afe **T**orque **O**ff	Safe torque off
TH/TF	**Th**ermostat/**T**emperatur**f**ühler (temperature sensor)	
TTL	**T**ransistor-**T**ransistor-**L**ogics	
c UL us	**U**nderwriters **L**aboratories Inc.	Certification issued in North America
ZK	DC link	

9.4 Terms and definitions

CAN bus system	Serial bus system for the automotive industry and industrial control devices. The bus medium is a twisted conductor pair with excellent transmission characteristics in the short-distance range of less than 40 m.
PROFIBUS	PROFIBUS (**Pro**cess **Fi**eld **Bus**) is a standard for fieldbus communication used in automation engineering.
K-Net	The XFA (K-Net) communication module is a slave module for connection to a serial bus system for high-speed data transfer.
EtherCAT®	The XFE24A communication component is a slave module for connection to EtherCAT® networks.
Multi-encoder card	The multi-encoder card enables evaluation of additional encoders.
EMC compliant housing	EMC compliant housings form a shield against electrical, magnetic or electromagnetic fields. These interference fields are generated by electrostatic discharges occurring during switching sequences, during rapid current or voltage changes, during operation of motors or high-frequency generators and similar situations. These EMC compliant housings are usually equipped with an EMC cable gland.
EMC cable gland	Seal of cable entry with option to apply a cable shield or contacting.
IP code	A coding system to indicate the degrees of protection offered by a housing against access to dangerous parts, ingress of solid foreign objects and the ingress of water.
Insulation resistance	Insulating property of a material to separate two neighboring contacts or one grounded contact at a relatively high resistance value.
Insulating materials	Insulation in plug connectors is ensured by using thermoplastics and thermosetting plastic. The selected material depends on the required thermal and mechanical properties.
Cable	Cables can consist of one or more cores, come equipped with insulating sleeves, shields and a sheath for the protection of structural elements. Cables connected to plug connectors are mainly flexible cables, flat cables, sheathed cables, shielded cables, and coaxial cables.
Firmware	Software provided by the manufacturer that cannot be changed by the user.

9.5 Declarations of conformity

EC Declaration of Conformity

SEW EURODRIVE

900100010

SEW-EURODRIVE GmbH & Co KG
Ernst-Blickle-Straße 42, D-76646 Bruchsal

declares under sole responsibility that the

frequency inverters of the series	**MOVIAXIS® 80A**	
are in conformity with		
Low Voltage Directive	**2006/95/EC**	
EMC Directive	**2004/108/EC**	**4)**
applied harmonized standards	**EN 61800-5-1:2007** **EN 61800-3:2007**	

4) According to the EMC Directive, the listed products are not independently operable products. EMC assessment is only possible after these products have been integrated in an overall system. The assessment was verified for a typical system constellation, but not for the individual product.

Bruchsal	11.12.09	Johann Soder	
Place	Date	Managing Director Technology	a) b)

a) Authorized representative for issuing this declaration on behalf of the manufacturer
b) Authorized representative for compiling the technical documents

EC Declaration of Conformity

900110010

SEW-EURODRIVE GmbH & Co KG
Ernst-Blickle-Straße 42, D-76646 Bruchsal

declares under sole responsibility that the

frequency inverters of the series	**MOVIAXIS® 81A**	
are in conformity with		
Machinery Directive	**2006/42/EC**	**1)**
Low Voltage Directive	**2006/95/EC**	
EMC Directive	**2004/108/EC**	**4)**
applied harmonized standards	**EN 13849-1:2008** **EN 60204-1:2007** **EN 61800-5-1:2007** **EN 61800-3:2007**	**5)**

1) These products are intended for installation in machines. Startup is prohibited until it has been established that the machinery into which these products are to be incorporated complies with the provisions of the aforementioned Machinery Directive.

4) According to the EMC Directive, the listed products are not independently operable products. EMC assessment is only possible after these products have been integrated in an overall system. The assessment was verified for a typical system constellation, but not for the individual product.

5) All safety-relevant requirements of the product-specific documentation (operating instructions, manual, etc.) must be met over the entire product life cycle.

Bruchsal	11.12.09	Johann Soder	
Place	Date	Managing Director Technology	a) b)

a) Authorized representative for issuing this declaration on behalf of the manufacturer
b) Authorized representative for compiling the technical documents

EC Declaration of Conformity

900120010

SEW-EURODRIVE GmbH & Co KG
Ernst-Blickle-Straße 42, D-76646 Bruchsal

declares under sole responsibility that the

frequency inverters of the series	**MOVIAXIS® 82A**	
are in conformity with		
Machinery Directive	**2006/42/EC**	**1)**
Low Voltage Directive	**2006/95/EC**	
EMC Directive	**2004/108/EC**	**4)**
applied harmonized standards	**EN 13849-1:2008** **EN 61800-5-2: 2007** **EN 60204-1:2007** **EN 61800-5-1:2007** **EN 61800-3:2007** **EN 201: 1996**	**5)**

1) These products are intended for installation in machines. Startup is prohibited until it has been established that the machinery into which these products are to be incorporated complies with the provisions of the aforementioned Machinery Directive.

4) According to the EMC Directive, the listed products are not independently operable products. EMC assessment is only possible after these products have been integrated in an overall system. The assessment was verified for a typical system constellation, but not for the individual product.

5) All safety-relevant requirements of the product-specific documentation (operating instructions, manual, etc.) must be met over the entire product life cycle.

Bruchsal	11.12.09	Johann Soder	
Place	Date	Managing Director Technology	a) b)

a) Authorized representative for issuing this declaration on behalf of the manufacturer
b) Authorized representative for compiling the technical documents

10 Address List

Germany			
Headquarters **Production** **Sales**	**Bruchsal**	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal P.O. Box Postfach 3023 • D-76642 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-1970 http://www.sew-eurodrive.de sew@sew-eurodrive.de
Production / Industrial Gears	**Bruchsal**	SEW-EURODRIVE GmbH & Co KG Christian-Pähr-Str.10 D-76646 Bruchsal	Tel. +49 7251 75-0 Fax +49 7251 75-2970
Service Competence Center	**Central**	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 1 D-76676 Graben-Neudorf	Tel. +49 7251 75-1710 Fax +49 7251 75-1711 sc-mitte@sew-eurodrive.de
	North	SEW-EURODRIVE GmbH & Co KG Alte Ricklinger Straße 40-42 D-30823 Garbsen (near Hannover)	Tel. +49 5137 8798-30 Fax +49 5137 8798-55 sc-nord@sew-eurodrive.de
	East	SEW-EURODRIVE GmbH & Co KG Dänkritzer Weg 1 D-08393 Meerane (near Zwickau)	Tel. +49 3764 7606-0 Fax +49 3764 7606-30 sc-ost@sew-eurodrive.de
	South	SEW-EURODRIVE GmbH & Co KG Domagkstraße 5 D-85551 Kirchheim (near München)	Tel. +49 89 909552-10 Fax +49 89 909552-50 sc-sued@sew-eurodrive.de
	West	SEW-EURODRIVE GmbH & Co KG Siemensstraße 1 D-40764 Langenfeld (near Düsseldorf)	Tel. +49 2173 8507-30 Fax +49 2173 8507-55 sc-west@sew-eurodrive.de
	Electronics	SEW-EURODRIVE GmbH & Co KG Ernst-Blickle-Straße 42 D-76646 Bruchsal	Tel. +49 7251 75-1780 Fax +49 7251 75-1769 sc-elektronik@sew-eurodrive.de
	Drive Service Hotline / 24 Hour Service		+49 180 5 SEWHELP +49 180 5 7394357 14 euro cents/min on the German landline network. Max 42 euro cents/min from a German mobile network. Prices for mobile and international calls may differ.
	Additional addresses for service in Germany provided on request!		

France			
Production **Sales** **Service**	**Haguenau**	SEW-USOCOME 48-54 route de Soufflenheim B. P. 20185 F-67506 Haguenau Cedex	Tel. +33 3 88 73 67 00 Fax +33 3 88 73 66 00 http://www.usocome.com sew@usocome.com
Production	**Forbach**	SEW-USOCOME Zone industrielle Technopôle Forbach Sud B. P. 30269 F-57604 Forbach Cedex	Tel. +33 3 87 29 38 00
Assembly **Sales** **Service**	**Bordeaux**	SEW-USOCOME Parc d'activités de Magellan 62 avenue de Magellan - B. P. 182 F-33607 Pessac Cedex	Tel. +33 5 57 26 39 00 Fax +33 5 57 26 39 09
	Lyon	SEW-USOCOME Parc d'affaires Roosevelt Rue Jacques Tati F-69120 Vaulx en Velin	Tel. +33 4 72 15 37 00 Fax +33 4 72 15 37 15

France			
	Nantes	SEW-USOCOME Parc d'activités de la forêt 4 rue des Fontenelles F-44140 Le Bignon	Tel. +33 2 40 78 42 00 Fax +33 2 40 78 42 20
	Paris	SEW-USOCOME Zone industrielle 2 rue Denis Papin F-77390 Verneuil l'Etang	Tel. +33 1 64 42 40 80 Fax +33 1 64 42 40 88
	Additional addresses for service in France provided on request!		

Algeria			
Sales	**Alger**	REDUCOM Sarl 16, rue des Frères Zaghnoune Bellevue 16200 El Harrach Alger	Tel. +213 21 8214-91 Fax +213 21 8222-84 info@reducom-dz.com http://www.reducom-dz.com

Argentina			
Assembly **Sales**	**Buenos Aires**	SEW EURODRIVE ARGENTINA S.A. Centro Industrial Garin, Lote 35 Ruta Panamericana Km 37,5 1619 Garin	Tel. +54 3327 4572-84 Fax +54 3327 4572-21 sewar@sew-eurodrive.com.ar http://www.sew-eurodrive.com.ar

Australia			
Assembly **Sales** **Service**	**Melbourne**	SEW-EURODRIVE PTY. LTD. 27 Beverage Drive Tullamarine, Victoria 3043	Tel. +61 3 9933-1000 Fax +61 3 9933-1003 http://www.sew-eurodrive.com.au enquires@sew-eurodrive.com.au
	Sydney	SEW-EURODRIVE PTY. LTD. 9, Sleigh Place, Wetherill Park New South Wales, 2164	Tel. +61 2 9725-9900 Fax +61 2 9725-9905 enquires@sew-eurodrive.com.au

Austria			
Assembly **Sales** **Service**	**Wien**	SEW-EURODRIVE Ges.m.b.H. Richard-Strauss-Strasse 24 A-1230 Wien	Tel. +43 1 617 55 00-0 Fax +43 1 617 55 00-30 http://www.sew-eurodrive.at sew@sew-eurodrive.at

Belarus			
Sales	**Minsk**	SEW-EURODRIVE BY RybalkoStr. 26 BY-220033 Minsk	Tel.+375 17 298 47 56 / 298 47 58 Fax +375 17 298 47 54 http://www.sew.by sales@sew.by

Belgium			
Assembly **Sales** **Service**	**Brussels**	**SEW-EURODRIVE n.v./s.a.** Researchpark Haasrode 1060 Evenementenlaan 7 BE-3001 Leuven	Tel. +32 16 386-311 Fax +32 16 386-336 http://www.sew-eurodrive.be info@sew-eurodrive.be
Service Competence Center	**Industrial Gears**	**SEW-EURODRIVE n.v./s.a.** Rue de Parc Industriel, 31 BE-6900 Marche-en-Famenne	Tel. +32 84 219-878 Fax +32 84 219-879 http://www.sew-eurodrive.be service-wallonie@sew-eurodrive.be

Brazil			
Production **Sales** **Service**	**Sao Paulo**	SEW-EURODRIVE Brasil Ltda. Avenida Amâncio Gaiolli, 152 - Rodovia Presidente Dutra Km 208 Guarulhos - 07251-250 - SP SAT - SEW ATENDE - 0800 7700496	Tel. +55 11 2489-9133 Fax +55 11 2480-3328 http://www.sew-eurodrive.com.br sew@sew.com.br

Bulgaria			
Sales	**Sofia**	BEVER-DRIVE GmbH Bogdanovetz Str.1 BG-1606 Sofia	Tel. +359 2 9151160 Fax +359 2 9151166 bever@bever.bg

Cameroon			
Sales	**Douala**	Electro-Services Rue Drouot Akwa B.P. 2024 Douala	Tel. +237 33 431137 Fax +237 33 431137 electrojemba@yahoo.fr

Canada			
Assembly **Sales** **Service**	**Toronto**	SEW-EURODRIVE CO. OF CANADA LTD. 210 Walker Drive Bramalea, ON L6T 3W1	Tel. +1 905 791-1553 Fax +1 905 791-2999 http://www.sew-eurodrive.ca l.watson@sew-eurodrive.ca
	Vancouver	SEW-EURODRIVE CO. OF CANADA LTD. Tilbury Industrial Park 7188 Honeyman Street Delta, BC V4G 1G1	Tel. +1 604 946-5535 Fax +1 604 946-2513 b.wake@sew-eurodrive.ca
	Montreal	SEW-EURODRIVE CO. OF CANADA LTD. 2555 Rue Leger Lasalle, PQ H8N 2V9	Tel. +1 514 367-1124 Fax +1 514 367-3677 a.peluso@sew-eurodrive.ca
	Additional addresses for service in Canada provided on request!		

Chile			
Assembly **Sales** **Service**	**Santiago de Chile**	SEW-EURODRIVE CHILE LTDA. Las Encinas 1295 Parque Industrial Valle Grande LAMPA RCH-Santiago de Chile P.O. Box Casilla 23 Correo Quilicura - Santiago - Chile	Tel. +56 2 75770-00 Fax +56 2 75770-01 http://www.sew-eurodrive.cl ventas@sew-eurodrive.cl

China			
Production **Assembly** **Sales** **Service**	**Tianjin**	SEW-EURODRIVE (Tianjin) Co., Ltd. No. 46, 7th Avenue, TEDA Tianjin 300457	Tel. +86 22 25322612 Fax +86 22 25323273 info@sew-eurodrive.cn http://www.sew-eurodrive.com.cn
Assembly **Sales** **Service**	**Suzhou**	SEW-EURODRIVE (Suzhou) Co., Ltd. 333, Suhong Middle Road Suzhou Industrial Park Jiangsu Province, 215021	Tel. +86 512 62581781 Fax +86 512 62581783 suzhou@sew-eurodrive.cn
	Guangzhou	SEW-EURODRIVE (Guangzhou) Co., Ltd. No. 9, JunDa Road East Section of GETDD Guangzhou 510530	Tel. +86 20 82267890 Fax +86 20 82267922 guangzhou@sew-eurodrive.cn
	Shenyang	SEW-EURODRIVE (Shenyang) Co., Ltd. 10A-2, 6th Road Shenyang Economic Technological Development Area Shenyang, 110141	Tel. +86 24 25382538 Fax +86 24 25382580 shenyang@sew-eurodrive.cn
	Wuhan	SEW-EURODRIVE (Wuhan) Co., Ltd. 10A-2, 6th Road No. 59, the 4th Quanli Road, WEDA 430056 Wuhan	Tel. +86 27 84478388 Fax +86 27 84478389 wuhan@sew-eurodrive.cn

China			
	Xi'An	SEW-EURODRIVE (Xi'An) Co., Ltd. No. 12 Jinye 2nd Road Xi'An High-Technology Industrial Development Zone Xi'An 710065	Tel. +86 29 68686262 Fax +86 29 68686311 xian@sew-eurodrive.cn
	Additional addresses for service in China provided on request!		

Colombia			
Assembly **Sales** **Service**	**Bogotá**	SEW-EURODRIVE COLOMBIA LTDA. Calle 22 No. 132-60 Bodega 6, Manzana B Santafé de Bogotá	Tel. +57 1 54750-50 Fax +57 1 54750-44 http://www.sew-eurodrive.com.co sewcol@sew-eurodrive.com.co

Croatia			
Sales **Service**	**Zagreb**	KOMPEKS d. o. o. Zeleni dol 10 HR 10 000 Zagreb	Tel. +385 1 4613-158 Fax +385 1 4613-158 kompeks@inet.hr

Czech Republic			
Sales	**Prague**	SEW-EURODRIVE CZ S.R.O. Business Centrum Praha Lužná 591 CZ-16000 Praha 6 - Vokovice	Tel. +420 255 709 601 Fax +420 220 121 237 http://www.sew-eurodrive.cz sew@sew-eurodrive.cz

Denmark			
Assembly **Sales** **Service**	**Copenhagen**	SEW-EURODRIVEA/S Geminivej 28-30 DK-2670 Greve	Tel. +45 43 9585-00 Fax +45 43 9585-09 http://www.sew-eurodrive.dk sew@sew-eurodrive.dk

Egypt			
Sales **Service**	**Cairo**	Copam Egypt for Engineering & Agencies 33 El Hegaz ST, Heliopolis, Cairo	Tel. +20 2 22566-299 +1 23143088 Fax +20 2 22594-757 http://www.copam-egypt.com/ copam@datum.com.eg

Estonia			
Sales	**Tallin**	ALAS-KUUL AS Reti tee 4 EE-75301 Peetri küla, Rae vald, Harjumaa	Tel. +372 6593230 Fax +372 6593231 veiko.soots@alas-kuul.ee

Finland			
Assembly **Sales** **Service**	**Lahti**	SEW-EURODRIVE OY Vesimäentie 4 FIN-15860 Hollola 2	Tel. +358 201 589-300 Fax +358 3 780-6211 http://www.sew-eurodrive.fi sew@sew.fi
Production **Assembly**	**Karkkila**	SEW Industrial Gears Oy Valurinkatu 6, PL 8 FI-03600 Karkkila, 03601 Karkkila	Tel. +358 201 589-300 Fax +358 201 589-310 sew@sew.fi http://www.sew-eurodrive.fi

Gabon			
Sales	**Libreville**	ESG Electro Services Gabun Feu Rouge Lalala 1889 Libreville Gabun	Tel. +241 741059 Fax +241 741059 esg_services@yahoo.fr

Great Britain			
Assembly **Sales** **Service**	**Normanton**	SEW-EURODRIVE Ltd. Beckbridge Industrial Estate Normanton West Yorkshire WF6 1QR	Tel. +44 1924 893-855 Fax +44 1924 893-702 http://www.sew-eurodrive.co.uk info@sew-eurodrive.co.uk
	Drive Service Hotline / 24 Hour Service		Tel. 01924 896911

Greece			
Sales	**Athens**	Christ. Boznos & Son S.A. 12, K. Mavromichali Street P.O. Box 80136 GR-18545 Piraeus	Tel. +30 2 1042 251-34 Fax +30 2 1042 251-59 http://www.boznos.gr info@boznos.gr

Hong Kong			
Assembly **Sales** **Service**	**Hong Kong**	SEW-EURODRIVE LTD. Unit No. 801-806, 8th Floor Hong Leong Industrial Complex No. 4, Wang Kwong Road Kowloon, Hong Kong	Tel. +852 36902200 Fax +852 36902211 contact@sew-eurodrive.hk

Hungary			
Sales **Service**	**Budapest**	SEW-EURODRIVE Kft. H-1037 Budapest Kunigunda u. 18	Tel. +36 1 437 06-58 Fax +36 1 437 06-50 office@sew-eurodrive.hu

India			
Registered Office **Assembly** **Sales** **Service**	**Vadodara**	SEW-EURODRIVE India Private Limited Plot No. 4, GIDC POR Ramangamdi • Vadodara - 391 243 Gujarat	Tel. +91 265 3045200, +91 265 2831086 Fax +91 265 3045300, +91 265 2831087 http://www.seweurodriveindia.com salesvadodara@seweurodrivein-dia.com
Assembly **Sales** **Service**	**Chennai**	SEW-EURODRIVE India Private Limited Plot No. K3/1, Sipcot Industrial Park Phase II Mambakkam Village Sriperumbudur - 602105 Kancheepuram Dist, Tamil Nadu	Tel. +91 44 37188888 Fax +91 44 37188811 saleschennai@seweurodriveindia.com

Ireland			
Sales **Service**	**Dublin**	Alperton Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458 info@alperton.ie http://www.alperton.ie

Israel			
Sales	**Tel-Aviv**	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 http://www.liraz-handasa.co.il office@liraz-handasa.co.il

Italy			
Assembly **Sales** **Service**	**Solaro**	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini,14 I-20020 Solaro (Milano)	Tel. +39 02 96 9801 Fax +39 02 96 799781 http://www.sew-eurodrive.it sewit@sew-eurodrive.it

Ivory Coast			
Sales	**Abidjan**	SICA Société industrielle & commerciale pour l'Afrique 165, Boulevard de Marseille 26 BP 1115 Abidjan 26	Tel. +225 21 25 79 44 Fax +225 21 25 88 28 sicamot@aviso.ci

Japan			
Assembly **Sales** **Service**	**Iwata**	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373855 http://www.sew-eurodrive.co.jp sewjapan@sew-eurodrive.co.jp

Kazakhstan			
Sales	**Almaty**	ТОО "СЕВ-ЕВРОДРАЙВ" пр.Райымбека, 348 050061 г. Алматы Республика Казахстан	Тел. +7 (727) 334 1880 Факс +7 (727) 334 1881 http://www.sew-eurodrive.kz sew@sew-eurodrive.kz

Latvia			
Sales	**Riga**	SIA Alas-Kuul Katlakalna 11C LV-1073 Riga	Tel. +371 6 7139253 Fax +371 6 7139386 http://www.alas-kuul.com info@alas-kuul.com

Lebanon			
Sales	**Beirut**	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 510 532 Fax +961 1 494 971 ssacar@inco.com.lb
Jordan Kuwait Saudi Arabia Syria	**Beirut**	Middle East Drives S.A.L. (offshore) Sin El Fil. B. P. 55-378 Beirut	Tel. +961 1 494 786 Fax +961 1 494 971 info@medrives.com http://www.medrives.com

Lithuania			
Sales	**Alytus**	UAB Irseva Statybininku 106C LT-63431 Alytus	Tel. +370 315 79204 Fax +370 315 56175 irmantas@irseva.lt http://www.sew-eurodrive.lt

Luxembourg			
Assembly **Sales** **Service**	**Brussels**	**SEW-EURODRIVE n.v./s.a.** Researchpark Haasrode 1060 Evenementenlaan 7 BE-3001 Leuven	Tel. +32 16 386-311 Fax +32 16 386-336 http://www.sew-eurodrive.lu info@sew-eurodrive.be

Malaysia			
Assembly **Sales** **Service**	**Johore**	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 sales@sew-eurodrive.com.my

Mexico			
Assembly **Sales** **Service**	**Quéretaro**	SEW-EURODRIVE MEXICO SA DE CV SEM-981118-M93 Tequisquiapan No. 102 Parque Industrial Quéretaro C.P. 76220 Quéretaro, México	Tel. +52 442 1030-300 Fax +52 442 1030-301 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx

Morocco			
Sales	**Casablanca**	Afit Route D'El Jadida KM 14 RP8 Province de Nouaceur Commune Rurale de Bouskoura MA 20300 Casablanca	Tel. +212 522633700 Fax +212 522621588 fatima.haquiq@premium.net.ma http://www.groupe-premium.com

Netherlands			
Assembly **Sales** **Service**	**Rotterdam**	VECTOR Aandrijftechniek B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 Service: 0800-SEWHELP http://www.sew-eurodrive.nl info@sew-eurodrive.nl

New Zealand			
Assembly **Sales** **Service**	**Auckland**	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. +64 9 2745627 Fax +64 9 2740165 http://www.sew-eurodrive.co.nz sales@sew-eurodrive.co.nz
	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz

Norway			
Assembly **Sales** **Service**	**Moss**	SEW-EURODRIVE A/S Solgaard skog 71 N-1599 Moss	Tel. +47 69 24 10 20 Fax +47 69 24 10 40 http://www.sew-eurodrive.no sew@sew-eurodrive.no

Pakistan			
Sales	**Karachi**	Industrial Power Drives Al-Fatah Chamber A/3, 1st Floor Central Commercial Area, Sultan Ahmed Shah Road, Block 7/8, Karachi	Tel. +92 21 452 9369 Fax +92-21-454 7365 seweurodrive@cyber.net.pk

Peru			
Assembly **Sales** **Service**	**Lima**	SEW DEL PERU MOTORES REDUCTORES S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 http://www.sew-eurodrive.com.pe sewperu@sew-eurodrive.com.pe

Poland			
Assembly **Sales** **Service**	**Lodz**	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 PL-92-518 Łódź	Tel. +48 42 676 53 00 Fax +48 42 676 53 49 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl
	Service	Tel. +48 42 6765332 / 42 6765343 Fax +48 42 6765346	Linia serwisowa Hotline 24H Tel. +48 602 739 739 (+48 602 SEW SEW) serwis@sew-eurodrive.pl

Portugal			
Assembly **Sales** **Service**	**Coimbra**	SEW-EURODRIVE, LDA. Apartado 15 P-3050-901 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt

Romania			
Sales **Service**	**Bucharest**	Sialco Trading SRL str. Madrid nr.4 011785 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 sialco@sialco.ro

Russia			
Assembly **Sales** **Service**	**St. Petersburg**	ZAO SEW-EURODRIVE P.O. Box 36 195220 St. Petersburg Russia	Tel. +7 812 3332522 +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru

Senegal			
Sales	**Dakar**	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 338 494 770 Fax +221 338 494 771 senemeca@sentoo.sn http://www.senemeca.com

Serbia			
Sales	**Beograd**	DIPAR d.o.o. Ustanicka 128a PC Košum, IV sprat SRB-11000 Beograd	Tel. +381 11 347 3244 / +381 11 288 0393 Fax +381 11 347 1337 office@dipar.rs

Singapore			
Assembly **Sales** **Service**	**Singapore**	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 http://www.sew-eurodrive.com.sg sewsingapore@sew-eurodrive.com

Slovakia			
Sales	**Bratislava**	SEW-Eurodrive SK s.r.o. Rybničná 40 SK-831 06 Bratislava	Tel. +421 2 33595 202 Fax +421 2 33595 200 sew@sew-eurodrive.sk http://www.sew-eurodrive.sk
	Žilina	SEW-Eurodrive SK s.r.o. Industry Park - PChZ ulica M.R.Štefánika 71 SK-010 01 Žilina	Tel. +421 41 700 2513 Fax +421 41 700 2514 sew@sew-eurodrive.sk
	Banská Bystrica	SEW-Eurodrive SK s.r.o. Rudlovská cesta 85 SK-974 11 Banská Bystrica	Tel. +421 48 414 6564 Fax +421 48 414 6566 sew@sew-eurodrive.sk
	Košice	SEW-Eurodrive SK s.r.o. Slovenská ulica 26 SK-040 01 Košice	Tel. +421 55 671 2245 Fax +421 55 671 2254 sew@sew-eurodrive.sk

Slovenia			
Sales **Service**	**Celje**	Pakman - Pogonska Tehnika d.o.o. UI. XIV. divizije 14 SLO - 3000 Celje	Tel. +386 3 490 83-20 Fax +386 3 490 83-21 pakman@siol.net

South Africa			
Assembly **Sales** **Service**	**Johannesburg**	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 494-3104 http://www.sew.co.za info@sew.co.za

South Africa			
	Cape Town	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 cfoster@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaco Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700-3451 Fax +27 31 700-3847 cdejager@sew.co.za
	Nelspruit	SEW-EURODRIVE (PTY) LTD. 7 Christie Crescent Vintonia P.O.Box 1942 Nelspruit 1200	Tel. +27 13 752-8007 Fax +27 13 752-8008 robermeyer@sew.co.za

South Korea			
Assembly **Sales** **Service**	**Ansan-City**	SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate 1048-4, Shingil-Dong Ansan 425-120	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-korea.co.kr master.korea@sew-eurodrive.com
	Busan	SEW-EURODRIVE KOREA Co., Ltd. No. 1720 - 11, Songjeong - dong Gangseo-ku Busan 618-270	Tel. +82 51 832-0204 Fax +82 51 832-0230 master@sew-korea.co.kr

Spain			
Assembly **Sales** **Service**	**Bilbao**	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. +34 94 43184-70 Fax +34 94 43184-71 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es

Sweden			
Assembly **Sales** **Service**	**Jönköping**	SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping	Tel. +46 36 3442 00 Fax +46 36 3442 80 http://www.sew-eurodrive.se jonkoping@sew.se

Switzerland			
Assembly **Sales** **Service**	**Basel**	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch

Thailand			
Assembly **Sales** **Service**	**Chonburi**	SEW-EURODRIVE (Thailand) Ltd. 700/456, Moo.7, Donhuaroh Muang Chonburi 20000	Tel. +66 38 454281 Fax +66 38 454288 sewthailand@sew-eurodrive.com

Tunisia			
Sales	**Tunis**	T. M.S. Technic Marketing Service Zone Industrielle Mghira 2 Lot No. 39 2082 Fouchana	Tel. +216 79 40 88 77 Fax +216 79 40 88 66 http://www.tms.com.tn tms@tms.com.tn

Turkey			
Assembly **Sales** **Service**	**Istanbul**	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Bagdat Cad. Koruma Cikmazi No. 3 TR-34846 Maltepe ISTANBUL	Tel. +90 216 4419163 / 4419164 Fax +90 216 3055867 http://www.sew-eurodrive.com.tr sew@sew-eurodrive.com.tr

Ukraine			
Assembly **Sales** **Service**	**Dnepropetrovsk**	SEW-EURODRIVE Str. Rabochaja 23-B, Office 409 49008 Dnepropetrovsk	Tel. +380 56 370 3211 Fax +380 56 372 2078 http://www.sew-eurodrive.ua sew@sew-eurodrive.ua

United Arab Emirates			
Sales **Service**	**Sharjah**	Copam Middle East (FZC) Sharjah Airport International Free Zone P.O. Box 120709 Sharjah	Tel. +971 6 5578-488 Fax +971 6 5578-499 copam_me@eim.ae

USA			
Production **Assembly** **Sales** **Service**	**Southeast Region**	SEW-EURODRIVE INC. 1295 Old Spartanburg Highway P.O. Box 518 Lyman, S.C. 29365	Tel. +1 864 439-7537 Fax Sales +1 864 439-7830 Fax Manufacturing +1 864 439-9948 Fax Assembly +1 864 439-0566 Fax Confidential/HR +1 864 949-5557 http://www.seweurodrive.com cslyman@seweurodrive.com
Assembly **Sales** **Service**	**Northeast Region**	SEW-EURODRIVE INC. Pureland Ind. Complex 2107 High Hill Road, P.O. Box 481 Bridgeport, New Jersey 08014	Tel. +1 856 467-2277 Fax +1 856 845-3179 csbridgeport@seweurodrive.com
	Midwest Region	SEW-EURODRIVE INC. 2001 West Main Street Troy, Ohio 45373	Tel. +1 937 335-0036 Fax +1 937 332-0038 cstroy@seweurodrive.com
	Southwest Region	SEW-EURODRIVE INC. 3950 Platinum Way Dallas, Texas 75237	Tel. +1 214 330-4824 Fax +1 214 330-4724 csdallas@seweurodrive.com
	Western Region	SEW-EURODRIVE INC. 30599 San Antonio St. Hayward, CA 94544	Tel. +1 510 487-3560 Fax +1 510 487-6433 cshayward@seweurodrive.com
	Additional addresses for service in the USA provided on request!		

Venezuela			
Assembly **Sales** **Service**	**Valencia**	SEW-EURODRIVE Venezuela S.A. Av. Norte Sur No. 3, Galpon 84-319 Zona Industrial Municipal Norte Valencia, Estado Carabobo	Tel. +58 241 832-9804 Fax +58 241 838-6275 http://www.sew-eurodrive.com.ve ventas@sew-eurodrive.com.ve sewfinanzas@cantv.net

Vietnam			
Sales	**Ho Chi Minh City**	**All sectors except for ports, mining and off-shore:** Nam Trung Co., Ltd 250 Binh Duong Avenue, Thu Dau Mot Town, Binh Duong Province HCM office: 91 Tran Minh Quyen Street District 10, Ho Chi Minh City	Tel. +84 8 8301026 Fax +84 8 8392223 namtrungco@hcm.vnn.vn truongtantam@namtrung.com.vn khanh-nguyen@namtrung.com.vn

Vietnam			
		Ports, mining and offshore: DUC VIET INT LTD Industrial Trading and Engineering Services A75/6B/12 Bach Dang Street, Ward 02, Tan Binh District, 70000 Ho Chi Minh City	Tel. +84 8 62969 609 Fax +84 8 62938 842 totien@ducvietint.com
	Hanoi	Nam Trung Co., Ltd R.205B Tung Duc Building 22 Lang ha Street Dong Da District, Hanoi City	Tel. +84 4 37730342 Fax +84 4 37762445 namtrunghn@hn.vnn.vn

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